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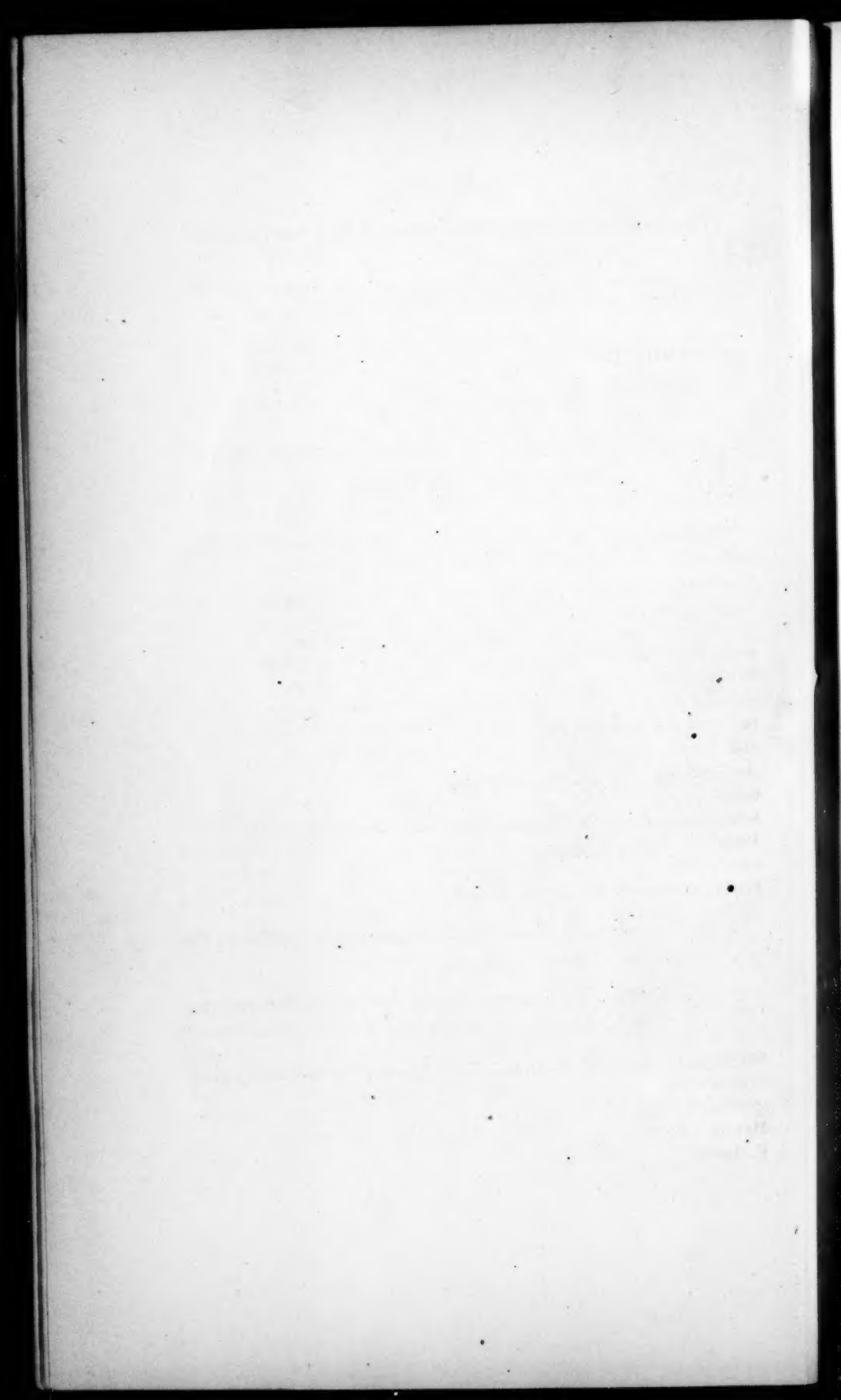
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CONTRIBUTIONS FROM THE GRAY HERBARIUM OF
HARVARD UNIVERSITY.

NEW SERIES. — No. X.

BY B. L. ROBINSON AND J. M. GREENMAN.

- I. Revision of the Genus *Tridax*.
- II. Synopsis of the Mexican and Central American Species of the Genus *Mikania*.
- III. Revision of the Genus *Zinnia*.
- IV. Revision of the Mexican and Central American Species of the Genus *Calea*.
- V. A Provisional Key to the Species of *Porophyllum* ranging North of the Isthmus of Panama.
- VI. Descriptions of New and little known Phanerogams, chiefly from Oaxaca.



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Presented May 13, 1896.

I. — REVISION OF THE GENUS TRIDAX.

TRIDAX, L. (Name supposed to come from *τρίς*, thrice, and *δακύν*, to bite, referring to the trifid rays.) — Heads terminal upon long peduncles, heterogamous and radiate or rarely homogamous and discoid. Involucre campanulate to sub-cylindric, 2-several-seriate, very rarely sub-uniseriate; scales all or at least the inner scarious and commonly purple-margined. Receptacle mostly conical. Ray-flowers, when present, fertile; ligules yellow, white, or roseate, clearly or obsoletely bilabiate; external lip 3-toothed or deeply trifid, obovate or oblong in outline, patulous; the inner of 1 or 2 short erect teeth or sometimes wanting; disk-flowers usually (if not always?) yellow, regular, 5-toothed. Anthers short, sagittate at the base, appendaged at the apex. Style-branches terminating in short or long subulate appendages. Achenes turbinate, hirsute or upwardly silky-villous, very rarely glabrous or nearly so. Pappus of several to many narrow ciliate scales attenuate to plumose awns (except in *C. dubia*). — Hort. Cliff. 418, & Gen. no. 979; DC. Prodr. v. 679; Benth. & Hook. f. Gen. ii. 392; Hoffm. in Engl. & Prantl, Nat. Pflanzenf. iv. Ab. 5, 247. *Bartolina*, Adans. Fam. ii. 124. *Sogalgina*, Cass. Bull. Philom. 1818, & Dict. Sci. Nat. xlix. 397. *Balbisia*, Willd. Spec. iii. 2214. *Galinsogea*, HBK. Nov. Gen. & Spec. iv. 252, t. 386. *Ptilostephium*, HBK. l. c. 253, t. 387, 388. *Carphostelphium*, Cass. Dict. Sci. Nat. xliv. 62. *Mandonia*, Wedd. Bull. Soc. Bot. Fr. xi. 50, t. 1, not Schz. Bip. — Pubescent annuals or perennials not rarely lig-nescient at the base, with leaves opposite, petiolate or subsessile, subentire or more often dentate or irregularly cleft or pinnatifid. About 22 known species, two of them of the S. American Andes, the others confined to Mexico, except a single species which extends also to Mauritius and E. India.

Subgenus *EUTRIDAX*. Scales of the involucre 2—several-seriate: achenes densely silky-villous or hirsute: pappus scales terminating in plumose awns.

§ 1. Scales of the involucre very unequal, regularly imbricated in several to many series, gradually decreasing in size; the outermost very short, mostly scarious and rounded at the summit, very rarely somewhat herbaceous or (in *T. angustifolia*) subacute.

* Heads discoid: pappus shorter than the achenes.

1. *T. brachylepis*, Hemsl. "Annual, erect," with "slender glabrescent branchlets" and "thickish ovate-lanceolate dentate or sometimes obscurely lobed leaves." — Biol. Cent.-Am. Bot. ii. 207. — Cordillera of Oaxaca, altitude 7,000 feet, *Galeotti*. The only specimen, seen by the writers, closely approximating in its characters Mr. Hemsley's description is no. 1423 of *E. W. Nelson*, collected in the Valley of Oaxaca, altitude 5,500 to 7,500 feet, 20 September, 1894. But although only the upper portion of the root is at hand it is not unlikely perennial.

2. *T. tuberosa*. Distinctly perennial; the elongated woody root at places tuberous-thickened: stem decumbent, subsimple, 3 feet in height, leafy to the middle, hirsute: leaves hirsute upon both surfaces, 3-nerved, 2 inches long, nearly half as broad, cuneate at the base and 3-cleft with sharply toothed acute lobes: heads about 6, nearly 7 lines long and 6 lines in diameter: pappus only a third to half the length of the achene. — Collected by *C. G. Pringle*, on the Sierra de San Felipe, Oaxaca, altitude 7,000 to 8,500 feet, 17 November, 1894, no. 5644 a.

3. *T. Pringlei*. Perennial, decumbent, much branched from near the base, 2 feet high, pubescent throughout but less hirsute than the preceding: root woody, tuberous-thickened at intervals: leaves lanceolate, dentate or subentire, obtusish, 1 to 1½ inches long, scarcely a third as broad, 1-nerved: heads 2 to 4, very similar in all respects to those of the preceding. — Collected by *C. G. Pringle*, on the Sierra de San Felipe, Oaxaca, altitude 7,500 feet, 7 September, 1894, no. 5644. In technical characters very close to the preceding species, but with markedly different foliage.

* * Heads radiate: ligules evident.

+ Mexican species.

↔ Rays yellow.

= Pappus very short or none.

4. *T. trilobata*, Hemsl. l. c. 208. Erect much branched glandular-pubescent annual, a foot or two high, with lance-oblong obtusish and coarsely few-toothed or lacinate leaves (cuneate at the base) and numer-

ous showy heads 10 lines to an inch in diameter, with dark purple involucre and broad bright orange-yellow rays. — *Galinsoga trilobata*, Cav. Icon. iii. 42, t. 282; Bot. Mag. t. 1895; Sweet, Brit. Fl. Gard. t. 56. *Sogalgina trilobata*, Cass. Dict. Sci. Nat. xlix. 397. — Valley of Mexico, *Bourgeau*, no. 846; near Chapultepec, *Schaffner*; and on calcareous bluffs, Flor de Maria, *Pringle*, no. 3148; also in Michoacan in fields near Patzcuaro, *Pringle*, no. 4271. The form without any trace of pappus does not appear to differ in any other particular. A specimen cultivated in the Botanic Garden of Harvard University has leaves oblong, subentire.

= = Pappus about equalling or somewhat exceeding the achenes.

5. *T. balbisioides*, Gray. Annual, much branched, pubescent: branches divaricate or the lowest decumbent: leaves from lanceolate and irregularly toothed to deeply ternately cleft or pinnately parted: heads rather numerous, nearly or quite an inch in diameter, with convex or conical disk and spreading showy rays: ligules (exclusive of tube) $2\frac{1}{2}$ to 4 lines long, as broad or broader. — Proc. Am. Acad. xv. 39. *T. coronopifolia*, Gray, l. c., not Hemsl. *Galinsoga balbisioides*, HBK. Nov. Gen. & Spec. iv. 253, t. 386. *Sogalgina balbisioides*, Cass. l. c. xlix. 398. — Originally collected in Guanajuato between the Valley of Santiago and Lake Palangeo, at 5,500 feet altitude, by *Humboldt & Bonpland*. It is described and figured by Kunth, l. c., as having entire or repand ligules of suborbicular contour. No plants with this character have since been observed, and we follow Dr. Gray in referring to the species the following, which differ only in their more or less distinctly 3-toothed rays: *Schaffner's* no. 238, and *Parry & Palmer's* no. 509, both from San Luis Potosi. Nor does *T. leptophylla*, Gray (l. c. xxi. 391), from Chihuahua (*Palmer's* no. 425, and *Pringle's* no. 769), appear to differ by any constant or satisfactory character. A form from San Luis Potosi, represented by *Parry & Palmer's* no. 508, has the ligules sometimes 3-toothed and sometimes divided nearly to the base into 3 oblong lobes. This plant was rather confidently referred by Dr. Gray (l. c. xv. 39) to *T. coronopifolia*, but it differs from that species decidedly in its much imbricated involucre, with very unequal and rounded scales, and in its attenuate chaff. Nor is the ligule strap-like. In stating it to be so Dr. Gray had presumably observed only one of the long oblong lobes of a very deeply trifid ray.

6. *T. petrophila*. Distinctly perennial from a lignescent base: stems several, very slender, erect or nearly so: branches ascending: leaves very narrow, linear, entire, toothed, or with 2 or 3 short linear lobes:

ray-flowers with ligules much smaller than in the preceding, about $1\frac{1}{2}$ lines in diameter: the tube being relatively very long and slender (4 to 5 lines in length): chaff terminating in a long and slender awn. — *T. balbisioides*, Gray, l. c. xxii. 430, not xv. 39. *T. balbisioides*, var. *tenuifolia*, Gray, (ined.) in distrib. Palmer and Pringle. — Jalisco, on the Rio Blanco, *Palmer*, no. 569; on rocky hills near Guadalajara, *Pringle*, nos. 2179, 2556. The later collections of Mr. Pringle show this plant quite distinct in its woody base and reduced rays from *T. balbisioides*.

→ → Rays white, purplish, or roseate.

= Pappus much longer than the achene.

7. *T. rosea*, Schz. Bip. in herb. Hirsutulous annual, leafy near the base and often with spreading branches: leaves linear-oblong, irregularly toothed or trifid with toothed lobes: peduncles becoming very long (6 to 10 inches), quite simple, naked or bearing 1 or 2 minute alternate bracts: heads large, with the spreading rays an inch or more in diameter: ligules oblong, 3 to 5 lines in length, slightly 3-toothed at the apex. — A good but apparently unedited species, founded by Schultz upon *Schaffner's* no. 60, from Guadalupe, and collected in the same locality by *Bilimek* in 1865, no. 488, and *Bourgeau*, no. 586; also in Valley of Mexico, *Schaffner*, no. 265.

= = Pappus shorter than or barely equalling the achene.

8. *T. Palmeri*, Gray. Pubescent or puberulent, 2 feet high, usually with a few ascending branches, naked above: leaves mostly much cleft or deeply and laciniately parted into narrow acute segments: rays broad, obovate, truncate, essentially entire, roseate: disk-flowers greenish yellow. — Proc. Am. Acad. xv. 38. — San Luis Potosi, on rocky bluffs at Alvarez, altitude 8,000 feet, *Parry & Palmer*, nos. 489, 490, 482 $\frac{1}{2}$, also *Schaffner*, no. 236.

Var. *indivisa*, Robinson & Seaton. Somewhat stouter and more densely pubescent: leaves ovate, subhastate, abruptly contracted into a petiole, repand-dentate, not lobed. — Proc. Am. Acad. xxviii. 109. — Ledges of cañons on mountains near Lake Chapala, Jalisco, *Pringle*, no. 4332. Mr. Pringle states that the base is perennial.

→ → South American species, of the Andes of Bolivia and Ecuador: leaves narrow: pappus longer than the achenes.

9. *T. Mandonii*, Schz. Bip. Branched, hirsute: leaves sinuate or repand-dentate: involucrel scales rounded at the apex, sparingly puberulent near the ends or quite glabrous: rays very small. — Bull. Soc. Bot. Fr. xii. 82, & *Linnæa*, xxxiv. 536. *Mandonia Boliviensis*, Wedd. Bull.

Soc. Bot. Fr. xi. 51, t. 1. — Near Sorata, Province of Larecaja, altitude 2,690 to 3,000 meters, *Mandon*, no. 289.

10. *T. angustifolia*, Benth. & Hook. f. Decumbent and rooting at the nodes, pubescent: leaves lance-linear, acute, denticulate or entire: involucre scales acutish, pubescent or puberulent on the outer surface; the outer ones inclining to be squarrose: ligules oblong, 2 or 3 lines in length. — Gen. ii. 392. — Collected in the Andes of Ecuador by *Spruce*, no. 5582.

§ 2. Involucral scales 2-3-seriate, less unequal; the outer often herbaceous and acutish.

* Leaves ovate to linear, pubescent to densely hirsute but not canescent.

+ Leaves relatively broad, subentire, toothed, or divided into a few rather broad lobes.

++ Pappus longer than or about equalling the achenes.

= Perennials with ligneous or lignescent base: rays short, nearly orbicular, 3-toothed.

11. *T. procumbens*, L. More or less densely hirsute with white hairs: stems several to many from a woody root or stock, decumbent or procumbent: leaves lanceolate to ovate-lanceolate, acute, sharply repand or sinuate-toothed, cuneate at the base: scales of the involucre oblong, acutish, usually villous-hirsute: chaff persistent: rays yellow or (?) white. — Spec. ii. 900. *Amellus pedunculatus*, Ort. *vide* Willd. Enum. 916. *Balbisia elongata*, Willd. Spec. iii. 2214. *B. pedunculata*, Hoffing. Verz. Pfl. 228. *B. divaricata*, Cass. Ann. Sci. Nat. xxiii. (1831) 90. — The most widely distributed species; Monterey, North Mexico, *Eaton & Edwards*, also *Pringle*, no. 1920; Wartenberg, near Tantoyuca, *Ervendberg*, no. 61; San Luis Potosi, *Parry & Palmer*, no. 520; "Coahuila and Nuevo Leon," *Palmer*, nos. 629, 2061; Orizaba, *Schaffner, Gray, Botteri*; Jalisco, *Palmer*, no. 297; Colima, *Palmer*, no. 1186; Oaxaca, *L. C. Smith*, no. 423, *E. W. Nelson*, nos. 2582, 2773; Guatemala, nos. 2370, & 4200 of Donnell Smith's sets. Also on Elliott's Key, Fla., *Simpson*, no. 553; Cuba, *Wright*, no. 2861. Introduced and now abundant in E. India and Mauritius.

Var. *ovatifolia*. Less hirsute, pubescence shorter, finer, and tending to become fuscous: base of stem ligneous: leaves ovate, acutish, serrate with small subequal obtusish teeth, finely pubescent upon both surfaces, 8 to 10 lines long, 6 to 8 lines broad, rather abruptly contracted at the base into short petioles: involucre bracts very broad, mostly obovate. — Collected by *E. W. Nelson* in the vicinity of Yalalag, Oaxaca, July, 1894, no. 948. Rather well marked in its foliage and possibly a distinct

species, but agreeing with the type in all floral characters except the somewhat broader involucre scales.

= = Annuals.

12. *T. obovata*, Turcz. Low, 4 to 6 inches in height: leaves obovate, subentire, obtuse: ligules short, yellowish. — Bull. Soc. Nat. Mosc. xxiv. 187; Walp. Ann. 238. — S. Mexico, on Sierra San Pedro, Nolasco, Talea, &c., *Jurgensen*, no. 124. Here we would refer specimens collected near Acapulco by *Palmer*, no. 165.

13. *T. erecta*, Gray. Slender, erect, hirsutulous, branching, a foot or so in height: leaves ovate-lanceolate and serrate or broadly ovate in outline and rather deeply 3-parted with acutish lobes: heads rather small: involucre ovate; one or two of the outer scales often narrow, oblong, and spreading: ligules short, only a line or two in length, 3-toothed, yellow. — Proc. Am. Acad. xxi. 390, 433. — Southwestern Chihuahua, *Palmer*, no. 285.

14. *T. tenuifolia*, Rose. Erect, pubescent, 1 to 2 feet high, branching: leaves ovate, petiolate, dentate but not lobed: outer scales of the involucre acuminate: rays conspicuous, 3 to 5 lines long, pale yellow or "bright white." — Contrib. U. S. Nat. Herb. iii. 319. *T. bicolor*, Gray, Proc. Am. Acad. xxi. 391, as to pl. *Palmer*. — Southwestern Chihuahua, on mountain sides above Batopilas, *Palmer*, no. 130.

Var. *microcephala*, Rose, l. c. Described as differing in its smaller heads and "slightly different disk corollas." — "Near Lodiego, *Palmer*, no. 1611."

++ ++ Pappus shorter than the achenes.

= Annual species of Northwestern Mexico: heads large, an inch in diameter.

15. *T. bicolor*, Gray. Erect annual, with leaves ovate to rather narrowly oblong-lanceolate, serrate-dentate, not lobed, narrowed to slender petioles: ligules reddish or purplish, cuneate-oblong, 3-toothed. — Pl. Fendl. 104. — Llanos in the Sierra Madre, W. Chihuahua, *Wislizenus*, no. 214; also among rocks, Bachimba, *Thurber*, no. 833, and on rocky hills near the town of Chihuahua, *Pringle*, no. 638.

= = Species of Southern Mexico, lignescent at the base.

16. *T. Galeottii*, Klatt. "Stem terete, branched, pilose: leaves petiolate, cuneate, irregularly lobed, pilose upon both surfaces, 2 inches long, 1½ inches broad, 3-nerved: heads solitary, terminal; involucre scales biseriate, the outer shorter: chaff 3-5-dentate at the apex." — Leopoldina, xxiii. 6. *Ptilostephium Galeottii*, Schz. Bip. *vide* Klatt, l. c. — Between San Andres and San Miguel, *Liebmann*, nos. 588, 693, and

Galeotti, no. 2472. A species not seen by the writers. The description is translated and condensed from the original characterization.

← ← Leaves very narrow, linear or lance-linear, or deeply cleft into narrow divisions: heads rather small, 4 to 6 lines broad: rays small, bilabiate, the external lip trifid.

17. *T. coronopifolia*, Hemsl. Low, much branched and spreading, pubescent or hirsute; leaves lance-linear, denticulate, lacinately toothed or pinnatifid with narrow linear unequal acute segments: peduncles slender, toward the summit finely strigillose with appressed white hairs, and lacking the glandular-tipped hairs so common in the genus: rays yellow (or white): pappus scales unequal, some of them subulate and ciliated, others plumose with scarcely dilated base. — Biol. Cent.-Am. Bot. ii. 207. *Ptilostephium coronopifolium*, HBK. Nov. Gen. & Spec. iv. 255, t. 387. We have little hesitation in including in this species also *Tridax trifida*, Gray, Proc. Am. Acad. xv. 39 (*Ptilostephium trifidum*, HBK. l. c. 255, t. 388), notwithstanding the considerable difference in the pappus represented by Kunth. After the examination of a number of specimens we doubt the specific significance of the difference in length of the pappus, and as to the difference in the breadth of the scales that is often considerable upon the same achene. — Mexico without locality, *Th. Coulter*, nos. 348, 430, and *Berlandier*; State of Mexico, *Bilimek*, no. 491, also *Bourgeau*, nos. 164, 705; Tacubaya, *Schaffner*; Mt. Orizaba, altitude 9,000 feet, *Seaton*, no. 273; Oaxaca, Soledad de Etla, altitude 5,300 feet, *L. C. Smith*, no. 361, and by same collector at Telixtlahuaca, no. 866; also by *E. W. Nelson*, in Valley of Oaxaca, altitude 5,100 to 5,800 feet, no. 1229. The formal variety ALBORADIATA (*T. trifida*, var. *alboradiata*, Gray, Proc. Am. Acad. xv. 39), with white rays, but apparently without other significant or constant differences, has a somewhat more northerly distribution, having been collected at San Luis Potosi, *Schaffner*, no. 239, *Parry & Palmer*, no. 511; in Jalisco, *Pringle*, no. 2902; and in Guanajuato, *Dugès*, no. 438.

18. *T. lanceolata*, Klatt. "Lower leaves broadly lanceolate and upper lance-linear, entire: chaff obovate." — Leopoldina, xxiii. 6. — "Tehuacan, *Liebmann*, no. 205; Cuernavaca, *Berlandier*, no. 1063." A species not seen by the writers and (as to description) distinguished from the preceding species chiefly by the characters quoted.

19. *T. imbricata*, Schz. Bip. "Leaves linear-lanceolate, entire, or 1-3-toothed, pilose, ciliated on the margins: external scales of the involucre obtuse, striate, dorsally puberulent." — Schz. Bip. in Klatt, Flora, 1885, 202. — "Real del Monte, *Ehrenberg*, no. 355." We suspect this to be merely a form of *T. coronopifolia*.

* * Whole plant canescent-tomentose : leaves linear, entire.

20. *T. candidissima*, Gray. Very white-woolly, 4 to 6 inches high, densely leafy below : leaves 1 to 1½ inches long, sessile by a sheathing base : peduncles solitary, terminal, naked : heads homogamous : involucre scales lanceolate, acute : pappus long. — Proc. Am. Acad. xv. 39. — On ashy soil, Angostura, San Luis Potosi, *Parry & Palmer*, no. 510. Not since rediscovered.

Subgenus *PSEUDOTRIDAX*. Scales of the involucre sub-uniseriate : achenes merely papillose-puberulent or glabrescent : scales of the pappus obtuse or obtusish, laciniately bordered : anomalous species connecting this genus with *Galinsoga*.

21. *T. (?) dubia*, Rose. Decumbent or procumbent pubescent herb ; stems about 2 feet long : leaves ovate, serrate, acutish, petiolate : heads subracemose or subcorymbose, 6 lines in diameter : involucre scales very few, about 5 : ray-flowers with short golden yellow 3-toothed ligules. — Contrib. U. S. Nat. Herb. i. 337, t. 33. — Along river bottoms, Colima, *Palmer*, no. 1173 ; also in lowlands near San Blas, Tepic, *Lamb*, no. 609.

Species (doubtless of *Eutridax* but otherwise) of doubtful affinities : not seen by the writers.

22. *T. Ehrenbergii*, Schz. Bip. "Stem herbaceous, elongated, climbing, sulcate, sparingly pilose, trichotomous : leaves rhomboidal, slender-petioled, acuminate serrate, 3-nerved, above sparsely pubescent, below pilose upon the nerves : head solitary, terminal, many-flowered : involucre campanulate : scales scarious, lacinate on the margins : chaff scarious, trifid, costate, mucronate : flowers of the disk campanulate, pilose, ciliated on the margin : pappus-scales fimbriate, shorter than the sericeous achene." — *Leopoldina* xxiii. 6. — "Chinantla, *Liebmann*, no. 598. Leaves 20 lines long, 9 lines broad."

II. — SYNOPSIS OF THE MEXICAN AND CENTRAL AMERICAN SPECIES OF THE GENUS MIKANIA.

MIKANIA, Willd. (Dedicated to *Professor Joseph Gottfried Mikan*, of Prague, born 1743, died 1814.) — Cylindrical involucre of four erect concave obtuse or acute equal or subequal scales, sometimes with a shorter external fifth scale. Receptacle small, naked. Flowers 4 (in *M. punctata* "7"), tubular, with campanulate throat and 5-toothed limb. Anthers appendaged at the apex, obtuse or truncate at the base. Style-branches long, filiform-clavellate. Achenes 5-angled, without intermediate ribs,

puberulent or glabrous. Pappus of many setæ in a single row, mostly about equalling or somewhat exceeding the achene, bright white or more commonly sordid, fuscous, or rufous. — Spec. iii. 1742; DC. Prodr. v. 187, vii. 270; Benth. & Hook. f. Gen. ii. 246; Hoffm. in Engl. & Prantl, Nat. Pflanzenf. iv. Ab. 5, 140. *Willughbæya*, Neck. Elem. i. 82. *Corymanthelium*, Kunze, Linnæa, xx. 19. — Mostly slender shrubby or herbaceous twiners or "rarely erect." Leaves opposite, usually ovate, cordate or hastate, and petiolate. Inflorescence spicately, racemosely, or corymbosely paniculate. A genus of some 175 good species nearly confined to Tropical or Subtropical America. *M. scandens* is also widely distributed in the United States and in the warmer parts of the Old World.

Subgenus 1. CYLINDROLEPIS. Truncate scales of the involucre not at all imbricated but strongly involute, each completely surrounding a flower.

1. *M. globosa*, Coulter. Glabrous or nearly so: leaves ovate, thickish, undulate-dentate, acuminate, rounded at the base, 5-nerved from near the base: heads in dense globose clusters; these in lateral or terminal panicles: each of the four flowers completely enveloped in an involucre scale: mature achenes not seen. — Bot. Gaz. xx. 46, where also called *Willughbæya globosa*. — Santa Rosa, Guatemala, altitude 4,000 feet, *Heyde & Lux* (no. 3430 of Donnell Smith's sets). A noteworthy species differing much in its involucre scales from any other known to us. It is said by Professor Coulter to resemble closely *M. smilacina* in "habit and structure." The likeness, however, does not extend to the heads, which are here completely divided into four compartments by the intrusion of the involute edges of the scales; while in *M. smilacina* the involucre is normally imbricated.

Subgenus 2. IMBRICATÆ. Scales of the involucre imbricated.

§ 1. Heads spicately or racemosely arranged on the opposite spreading branches of ample pyramidal panicles.

* Heads pedicelled.

2. *M. Houstonis*, Willd. Glabrous climbing shrub, with ovate acuminate entire petiolate leaves. — Spec. iii. 1742; DC. Prodr. v. 190. — S. Mexico, Vera Cruz, *Houston*, and (acc. to Hemsl.) "Linden, no. 1169; Yucatan and Tabasco, *Johnson*, no. 25; Guatemala, Las Escamillas, *Hartweg*, no. 535; Chojoja, near Mazatenango, *Bernoulli*, no. 100; Panama, Barbacoas, *S. Hayes*." The only plants in Herb. Gray agreeing with the character of this species are *Ervendberg's* nos. 87, 222, from Wartenberg, Huasteca, Mexico.

* * Heads sessile.

← Heads very small: pappus bright white: branchlets winged.

3. *M. pterocaula*, Schz. Bip. Glabrous twiner: leaves ovate, acuminate, dentate, thin, 5-nerved from the base: branchlets 6-winged. — Schz. Bip. in Hemsl. Biol. Cent.-Am. Bot. ii. 103 (name only); first described by Klatt, Leopoldina, xx. 4. — Mirador, *Liebmann*, no. 101.

← ← Heads larger: pappus tawny or rufescent: branchlets terete, striate but not winged: leaves entire.

4. *M. leiostachya*, Benth. Leaves large, firm in texture, ovate with acuminate apex and rounded base, pinnately 5-nerved from above the base, glabrous above, finely fuscous-pubescent on the veins beneath, at length wholly glabrate, the larger ones 3 or 4 inches in breadth: spikes 1 to 2 inches long. — Pl. Hartw. 201. — Columbia and Panama, *Seemann*, no. 446; also at Gatun Station, on the Panama Railway, *Hoyes*. Said also to extend southward to Peru.

5. *M. Hookeriana*, DC. Leaves narrower, thinner, 3-nerved: spikes less than an inch in length: pappus rufous. — Prodr. v. 195. — Ascribed to Nicaragua and Panama by Hemsley. We have seen no specimens from any part of Mexico or Central America. The description is drawn from *Schomburgk's* no. 479 from Brit. Guiana.

§ 2. Heads not distinctly spicate nor racemose, disposed in ample terminal panicles: branchlets densely tawny-hirsute or woolly.

6. *M. pyramidata*, Donnell Smith. A tall climber densely covered with ferrugineous hirsute pubescence: panicle loose: heads not glomerate: leaves ovate, acuminate, rounded at the base, pinnately 5-nerved from somewhat above the base. — Bot. Gaz. xiii. 188. — Coban, Dept. Alta Verapaz, Guatemala, altitude 4,300 feet, *von Tuerckheim* (no. 1106 of Donnell Smith's sets).

7. *M. eriophora*, Schz. Bip. Densely tawny-tomentose, the inflorescence woolly: heads somewhat glomerate: leaves ovate, cordate, sharply acuminate, pubescent above, tomentose beneath, 5-nerved from the base, 3 to 4 inches long, 2 inches broad. — Schz. Bip. in Hemsl. l. c. (name only). — Mirador, *Liebmann*, no. 94.

§ 3. Heads disposed in roundish or flattish cymose corymbs.

* Heads rather large, when mature 4 to 5 lines in length.

← Scales of the involucre obtuse: leaves ovate, distinctly cuneate at the base.

8. *M. olivacea*, Klatt. "Leaves entire." — Bull. Soc. Bot. Belg. xxxi. 195. — Forests of Buenos Ayres, Costa Rica, *Pittier*, no. 4433.

9. *M. Guaco*, Humb. & Bonpl. Leaves (*ex icone*) denticulate. — Pl. Æquin. ii. 84, t. 105. Said by Index Kew. to equal *M. amara*,

Willd. Spec. iii. 1744, but apparently very different from Aublet's plate of *Eupatorium parviflorum*, Pl. Guian. ii. t. 315. — Nicaragua and Panama, acc. to Hemsley.

— Scales of the involucre obtuse: leaves cordate-hastate at the base.

10. *M. punctata*, Klatt, l. c. Heads described as 7-flowered. — Clairières du Général, Costa Rica, Pittier, no. 3434, and banks of a stream at Buenos Ayres by same collector, no. 4934.

— Scales of the involucre acute: leaves cordate or hastate, rarely subtruncate at the base.

11. *M. cordifolia*, Willd. l. c. 1746. *M. suaveolens*, HBK. Nov. Gen. & Spec. iv. 135. *M. gonoclada*, DC. Prodr. v. 199. *M. Fendleri*, Klatt, Abh. Naturf. Gesellsch. Halle, xv. 4 (of reprint). — W. Louisiana, Hale; Mexico, San Luis Potosi, Palmer, nos. 1079, 1115, and on rocky slopes of Tamasopa Cañon, Pringle, no. 3928; Colima, Palmer, no. 1207; Acapulco, Palmer, no. 565; Cordova, Bourgeau, no. 1812; Wartenberg, Huasteca, Ervendberg, no. 82; Mirador, Sartorius; also somewhat doubtful specimens from Guatemala, altitude 4,600 feet, Donnell Smith, no. 2366, and Navarro, Costa Rica, by the same collector, no. 4855.

* * Heads decidedly smaller, $2\frac{1}{2}$ to 3 lines in length.

12. *M. scandens*, Willd. l. c. 1743. Leaves smoothish, acuminate; hastate basal lobes little spreading. — *M. Orinocensis*, HBK. l. c. 134. *Eupatorium scandens*, L. Spec. ii. 836; Jacq. Ic. Rar. t. 169. — From N. Eng. to W. Canada, Florida, and Texas; Mexico, Victoria, Tamaulipas, Berlandier, nos. 852, 2272; San Blas, W. G. Wright, no. 1339; Cordova, Bourgeau, nos. 1632, 2184; Orizaba, Botteri; Oaxaca at Cuicatlan, L. C. Smith, no. 247, and near Reyes, E. W. Nelson, no. 1861; Guatemala, Esquintla, Hayes, Masagua, Donnell Smith, no. 2394, and Ambelice, Heyde & Lux (no. 3434 of Donnell Smith's sets); Nicaragua, C. Wright; Panama, Seemann; also W. India, Trop. Am., and warmer parts of the Old World.

13. *M. denticulata*, Willd. l. c. 1744. Leaves very scabrous, obtusish, hastate basal lobes widely spreading. — S. Mexico at Jalapa acc. to Lessing; Guiana, Schomburgk.

Dubious species.

M. ANGULATA, *M. REPANDA*, and *M. TLALIXCOYAN*, La Llave, El Mosaico Mexicano, ii. 299; Seemann in Hook. Jour. Bot. & Kew Misc. v. 79, from Cordova and vicinity, are unrecognized species founded solely upon foliar and very doubtful characters.

M. CORIACEA, La Llave, l. c., Seemann, l. c., is from its alternate leaves positively to be thrown out of the genus.

III.—A REVISION OF THE GENUS ZINNIA.

ZINNIA, L. (Dedicated to *Professor Johann Gottfried Zinn*, of Göttingen, born 1727, died 1759). — Heads radiate: disk-flowers hermaphrodite, fertile; ray-flowers pistillate, fertile, with suborbicular oval or oblong sessile persistent white, yellow, red, or purple ligules. Involucre ovate-cylindric or campanulate, the scales 3-many-seriate, broad, closely imbricated, obtuse or rounded, often more or less colored and slightly inflated or subsquarrose just beneath the summit. Disk conical to columnar: chaff scarious, more or less carinate, enveloping the flowers, often erose at the mostly obtusish apex. Corollas of the disk-flowers tubular with narrow scarcely ampliate throat and 5-toothed limb. Anthers appendaged at the apex, entire at the base. Style-branches obtuse, scarcely or not at all appendaged. Achenes laterally compressed, glabrous or ciliolate on the edges, 2-toothed at the summit and frequently 1-awned from the inner angle or rarely 2-awned; the achenes of the rays triquetrous, 3-toothed, with or without 1 to 3 short or long awns. — Gen. ed. 6, no. 974; Gray, Pl. Wright. i. 105; Benth. & Hook. f. Gen. ii. 357; Hoffm. in Engl. & Prantl, Nat. Pflanzenf. iv. Ab. 5, 225. *Crassina*, Scep. in Diss. and *Lejica*, Hill, Exot. Bot. t. 29, *vide* Endl. *Sanvitaliopsis*, Schz. Bip. acc. to Benth. & Hook. f., l. c. — Annuals, perennial herbs, or suffrutescent plants with opposite mostly entire leaves and showy terminal pedunculate or subsessile heads. About a dozen species known in nature, and three or four others somewhat doubtfully distinguished in horticulture, beside obviously artificial varieties and hybrids. The range of the genus is from the S. United States to Chili and Brazil, but it attains its greatest specific diversity in Mexico.

§ 1. Low caespitose perennials, shrubby at the base and many-stemmed: stems (or perhaps better subsimple branches) erect, crowded, or fastigiate: root stout, ligneous: leaves strictly linear to acerose, often fascicled and rigidulous, mostly rather pale. — §§ *Diplothrix* & *Heterogyne*, Gray, l. c.

* Ligules showy, much exceeding the achenes, white or pale yellow.

+ Leaves 1-nerved.

1. *Z. acerosa*, GRAY. Leaves acerose, obscurely 1-nerved, much crowded, rather sharp-pointed but scarcely pungent, 6 to 8 or 10 lines long. — Pl. Wright. i. 106. *Diplothrix acerosa*, DC. Prodr. v. 611. — Hills of W. Texas, near Pecos, Wright, no. 324, Thurber, no. 125; Mexico, San Luis Potosi, Berlandier, no. 1343, Parry & Palmer, no. 440½; Coahuila, Palmer, nos. 577, 578.

2. *Z. pumila*, Gray. Very similar to the preceding: leaves linear, flat, mostly less than half inch long, prominently 1-nerved. — Pl. Fendl. 81, Pl. Wright. i. 105, & ii. 86. — Hills, W. Texas, *Wright*, nos. 323, 1215, to Arizona, Camp Grant, *Palmer*, no. 122, near Tucson, *Greene*, no. 1106, Camp Lowell, *Pringle*, *Lemmon*, nos. 91, 92, near Sta. Catalina, *Lemmon*, no. 3033, Lowell Mts., *W. F. Parish*; Mexico, on high plains near San Juan de la Vequeria and at "Castaniola" (= Castanuela?), *Gregg*, no. 279; on llanos of Sonora, *Schott*; east of Guadalupe Cañon, *E. K. Smith*; near Carneros Pass, Coahuila, *Pringle*, no. 2390 (distrib. as *Z. acerosa*); San Luis Potosi, *Schaffner*, no. 336, and *Parry & Palmer*, nos. 439, 440. The technical distinctions between this and the preceding are unsatisfactory at best, although the specimens are for the most part pretty readily distinguished upon the foliar differences.

+ + Leaves 3-nerved.

3. *Z. juniperifolia*, Gray. Leaves somewhat longer than in the related species, the larger ones inch or more in length, usually whitish beneath: rays oblong, mostly 2 or even 3 times as long as broad, of deep orange color. — Pl. Wright. i. 105. *Diplothrix juniperifolia*, DC. Prodr. v. 612. — North Mexico, mountains near San Juan de Vanegas, *Berlandier*, 1359; without locality, *Gregg*, no. 68; Santillo, *Parry*, no. 40, and near same locality, *Palmer*, no. 576; and on limestone hills, Carneros Pass, *Pringle*, no. 2404.

4. *Z. grandiflora*, Nutt. Leaves less than an inch in length: rays pale or sulphur yellow, very broad, suborbicular in outline. — Nutt. in Torr. & Gray, Fl. ii. 298; Torr. in Emory, Report Recon. Calif. t. 4. — Colorado, on bluffs near Pueblo, *Greene*, to W. Texas, *Wright*, nos. 322, 1213, *Pope*, Ft. Davis, *Girard*; New Mexico, *Fendler*, no. 400, near Santa Fé, *Wislizenus*, no. 415; Arizona, near Ft. Whipple, *Coues & Palmer*, no. 2821, Ft. Apache, *Palmer*, no. 583, Mustang Mts., *Pringle*, Huerfano, *Parry*, no. 106, Upper Canadian River, *Emory*; Sonora, *Thurber*, no. 312, *Smith*; San Cedro, *Lloyd*, no. 401.

* * Ligules almost obsolete, shorter or scarcely longer than the achenes.

5. *Z. anomala*, Gray. Scabrous-pubescent: leaves 9 lines to inch in length, line to line and a half in breadth: heads 3 to 5 lines in diameter, appearing discoid or with evident but short yellow rays: disk-flowers apparently orange-red; the limb velvety-margined. — Pl. Wright. i. 106. — Prairies of W. Texas, *Wright*, nos. 325, 1216; near Saltillo, Coahuila, Mexico, *Palmer*, no. 581. First coll. (acc. to Gray, l. c.) by *Berlandier* in Northern Mexico.

§ 2. Erect or procumbent herbs, sometimes a little woody at the base ; stems and branches loosely spreading ; leaves linear, lance-linear, or elliptic-oblong : rays rather short, suborbicular or quadrate to oblong, 2 to 6 lines in length, white or sulphur yellow.

* Achenes with interrupted callous margins and somewhat tufted ciliation : slender erect annual with small heads and very pale or bright white rays.

6. *Z. bicolor*, Hemsl. Becoming a foot or so in height : leaves linear to lance-oblong, an inch to inch and half long, 1 to 4 lines broad, obtuse. — Biol. Cent.-Am. Bot. ii. 153, as to syn., but not as to specimens cited, except that of *Mendez*. *Z. maritima*, Gray, Proc. Am. Acad. xxii. 423, in part. *Mendezia bicolor*, DC. Prodr. v. 533 ; Deless. Icon. iv. t. 29. — West of Guanajuato, *Mendez* ; San Luis Potosi, *Schaffner*, no. 337 ; Jalisco, at Tequila, *Palmer*, no. 355, and on slopes of cañons near Guadaluajara, *Pringle*, no. 2313. The last two distributed as *Z. maritima*, from which this erect white-rayed plant of the inland is amply distinct.

* * Achenes evenly margined and regularly ciliated ; rays yellow or orange.

7. *Z. Greggii*. Slender pubescent herb, becoming scabrous, erect or decumbent merely at the base : leaves linear or nearly so, 1-3-nerved, sessile : heads slender-peduncled, terminating the spreading nearly naked branches, these bearing mostly only a single pair of linear leaves : rays varying from very short-oblong to half inch in length : disk-flowers orange ; ray-flowers pale yellow ; ray-achenes about a line in length : disk-achenes bearing a single slender awn. — *Z. bicolor*, Hemsl. l. c. as to plants of *Coulter* and of *Seemann*, but not as to syn. *Z. maritima*, Gray, Proc. Am. Acad. xxii. 423, as to narrow-leaved form, not HBK. — Mexico, without locality, *Gregg*, 1848-1849, no. 1082 ; also *Baites* ; W. Mexico, *Seemann* ; none of these specimens show the base perfectly, but a plant apparently identical, collected by *F. H. Lamb* on plains at Zopelote, Tepic, 9 February, 1895, no. 555, has a thickish perennial root.

8. *Z. littoralis*. Procumbent spreading herb, probably of biennial or perennial duration : stems leafy, branched, striate, puberulent : leaves elliptic-oblong or elliptic-lanceolate, obtuse or obtusish at both ends, 3 (or obscurely 5)-nerved and reticulated, green on both sides, 4 to 10 lines long, a third to half as broad : heads scarcely peduncled, borne at the ends of leafy branches : rays orbicular or nearly so, pale yellow, striate and greenish toward the ends beneath : disk-flowers bright orange-colored ; chaff oblong, very obtuse or truncate : achenes with a very narrow cartilaginous margin, ciliated : pappus of a single awn with or without a shorter second one : achenes of the ray-flowers about $1\frac{1}{2}$ lines long, tuberculate. — Collected at Mazatlan by *Th. Coulter*, and redis-

covered on dry hills of the coast at the same point by *W. G. Wright*, January, 1889, no. 1201 (distributed as *Z. maritima*?); also by *F. H. Lamb* on dry rocky cliffs at same place, 26 December, 1894, no. 325 (distributed as *Z. maritima*). In the presence of good material of all three species we cannot doubt the complete distinctness of this species from the preceding and from the following.

§ 3. Herbs with ovate or elliptic-oblong leaves: heads strongly bicolorous; disk dark purple-brown, nearly black; rays oblong, bright yellow.

9. *Z. maritima*, HBK. Prostrate, much branched from the base: stems spreading: leaves elliptic or elliptic-oblong, obtuse at the apex, rather abruptly contracted to short but distinct pubescent petioles: heads 8 to 10 lines in diameter (incl. rays), terminal, mostly borne on long naked peduncles: chaff narrowed above although obtusish at the dark-colored point; achenes of the disk-flowers strongly callous-margined: rays oblong, golden yellow; ray-achenes $1\frac{1}{2}$ to 2 lines long. — Nov. Gen. iv. 251, not Gray, l. c. — Acapulco, *Humboldt & Bonpland*; rediscovered at the same point by *Palmer*, February, 1895, no. 523. From its peduncled heads, oblong rays, callous-margined achenes, etc., we cannot doubt that Dr. Palmer's plant represents the real *Z. maritima* which came from the same locality so long ago. Yet Palmer's plant has leaves considerably larger than those described by Kunth.

10. *Z. Palmeri*, Gray. Erect branched annual, a foot or so in height: leaves ovate, or lanceolate from an ovate cordate or subcordate closely sessile base, acute or acuminate at the apex. — Proc. Am. Acad. xxii. 423. — Jalisco, at Tequila, *Palmer*, no. 386, *Pringle*, no. 4557; also at Manzanillo, *Palmer*, no. 893, and Colima, *Palmer*, no. 893 a.

§ 4. Erect perennials with spreading branches and narrow linear or oblong leaves: rays oblong, 4 to 12 lines in length, deep orange-colored as well as the disk-flowers.

11. *Z. linearis*, Benth. Much branched, 8 inches to a foot or two in height: heads many and very showy, of intense orange color (persisting even in old dried specimens): leaves linear or nearly so. — Pl. Hartw. 17. — Aguas Calientes, *Hartweg*, no. 117; San Luis Potosi, near Morales, *Schaffner*, no. 210, and in same state by *Parry & Palmer*, no. 441; Jalisco, on the Rio Blanco, *Palmer*, no. 54, and on hills near Guadalajara, *Pringle*, no. 1778.

Var. *latifolia*, Rose. Leaves somewhat broader, oblong. — Contrib. U. S. Nat. Herb. i. 102. — Alamos, *Palmer*, no. 352.

§ 5. Distinctly annual herb with showy flowers: disk and rays concolorous, yellow, red, or purple, or if discolorous the disk-flowers yellow or greenish and the rays red or purple: leaves ovate, lanceolate, or elliptic.

* Leaves sessile or nearly so, entire.

+ Achenes of the disk-flowers short and broad, obovate, 2 to 2½ lines in length: stems hirsute with spreading hairs.

12. *Z. angustifolia*, HBK. Branching, 1½ to 2 feet high: leaves lance-linear from a sessile ovate base: disk very convex, orange-yellow from the abundant acute exserted chaff (orange-yellow minutely tipped with purple at the very summit); disk-flowers at first orange and becoming darker with age: rays paler yellow. — Nov. Gen. & Spec. iv. 251; DC. Prodr. v. 536. — Originally collected in the neighborhood of Guanajuato by *Humboldt & Bonpland*, and described as having leaves "scarcely 2 lines broad." Our only authentic specimen of this species is one of *Mendez* sent by De Candolle to Dr. Gray and mentioned in the Prodr. as of this species. From other details of the description we cannot doubt that De Candolle was right in referring this plant to Kunth's species, although in it and in all the following specimens attributed to this species the leaves are considerably broader than originally described, varying from 3 to 8 lines in breadth. Evidently identical with *Mendez'* plant are specimens collected at Morelia, *Ghiesbreght*; no. 369 (?*Z. Ghiesbreghtii*, Verlot, Rev. Hort. 1862, 368; Vilmorin, Fl. Pl. Terre, 971, = *Z. Mexicana*, Hort. *vide* Vilmorin, l. c.), and near La Barca, Jalisco, *Pringle*, no. 3866; also cultivated plants from the Harvard Botanic Garden, dated 1861 and 1865. From this species, notwithstanding its still broader leaves, we cannot confidently separate the horticultural *Z. Haageana*, Regel, Gartenfl. x. 355, *ex char.*

13. *Z. elegans*, Jacq. Erect: stems less branched: leaves broader, ovate or elliptic, closely sessile and clasping, inch or so in breadth: disk-flowers yellow or orange, scarcely or not at all exceeded by the purplish tipped chaff; rays numerous, purple or lilac. — Coll. & Icon. Pl. Rar. iii. t. 589; Sims, Bot. Mag. t. 527. — South Mexico, Zitacuaro, *Hartweg*; mountains of Tixtla near Cuernavaca, *Berlandier*, no. 975; also without locality, *Ghiesbreght*, no. 306. Extensively cultivated in various countries.

+ + Achenes longer, narrower, oblong, 3 or 4 lines in length.

→ Hirsute with spreading hairs: rays rather broad, patulous, yellow as well as the disk.

14. *Z. pauciflora*, L. Erect roughish-pubescent annual, somewhat corymbosely branched above: peduncles at maturity enlarged upwards and fistulous: the yellow heads about an inch in diameter. — Spec. ed. 3, 1269; Lam. Ill. t. 685, f. 1; DC. Prodr. v. 535. *Z. lutea*, Gärtn. Frucht. ii. 459, t. 172. — Chiapas, Mexico, *Nelson*, no. 3074; Andes of Peru, *Mathews*, no. 456, and Bolivia, *Mandon*, no. 38; also St. Thomas, W. I., *Eggers*, no. 400. Introduced in W. Africa at Cape Verd.

→ → Pubescence of the stem much finer, appressed or very rarely spreading: rays red or purple, mostly narrow and suberect or scarcely spreading.

15. *Z. multiflora*, L. l. c. Erect annual with habit of the preceding, or subsimple: leaves ovate and acute or ovate-oblong and obtusish: peduncles (frequently short or none) often thickened upwards. — L. f. Dec. Ups. 23, t. 12; Curtis, Bot. Mag. t. 149. *Z. tenuiflora*, Jacq. Icon. Pl. Rar. iii. 590. *Z. leptopoda*, DC. Prodr. v. 535 (merely weak form or state with more slender peduncles). *Z. floridana*, Raf. New Fl. iv. 70. *Z. intermedia*, Engelm. in Wisliz. Tour N. Mex. 107. *Z. Mendocino*, Philippi, Sert. Mendoc. Alt. 27, *vide* Baker, Fl. Bras. vi. pt. 3, 178. — The commonest and most widely distributed species extending from Florida, *Chapman*, *Curtiss*, no. 1417, to Texas, *Drummond*, no. 115, *Lindheimer*, no. 93 (but in these localities probably introduced; see Gray, Syn. Fl. i. pt. 2, 253); S. Arizona near Ft. Huachuca, *Lemon*, no. 2761; throughout Mexico, Sonora, *Wright*, no. 1213, *Thurber*, no. 920, *Schott*, *Hartman*, no. 104; Chihuahua, *Thurber*, no. 832, *Schott*, *Wislizenus*, *Palmer*, nos. 115, 156, *Pringle*, no. 316; Coahuila, *Palmer*, nos. 574, 575; San Luis Potosi, *Parry & Palmer*, no. 438; Orizaba, *Bourgeau*, no. 1682, *Botteri*, nos. 73, 516, 940, *Seaton*, no. 345; Cordova, *Bourgeau*, no. 1633; Guadalupe, *Bourgeau*, no. 500; Oaxaca, *Andrieux*, no. 314, *L. C. Smith*, nos. 813, 957; Chiapas, *Ghiesbreght*, no. 126; Guatemala, *Heyde & Lux* (no. 3808 of Donnell Smith's sets); Venezuela, *Fendler*, no. 1974; Bolivian Andes, *Mandon*, nos. 39, 40, and *Bang*, no. 207.

The yellow-rayed specimens, referred by various authors to this species, have in most instances, if not always, the pubescence of *Z. pauciflora*, to which it seems best to refer them.

* * Leaves elliptic, petiolate, dentate.

Z. Liebmannii, Benth. & Hook. f. Leaves squamulose-hirsute above, ferrugineous beneath: peduncles quadrangular-sulcate: chaff

aculeate or uncinata. — Benth. & Hook. f. acc. to Klatt, Leopoldina, xxiii. 2, where first described. — Mexico on the Rio Taba, *Liebmann*, no. 552.

Doubtful species known chiefly or exclusively from cultivated specimens.

Z. RÆZLII, Hort. Gard. Chron. 1872, page 1392; Hook. f. & Jackson, Ind. Kew. ii. 1251, is a mere horticultural name for a yellow-flowered annual species said to come from Mexico, but never properly described.

Z. VERTICILLATA, Andrews, Bot. Rep. iii. t. 189, is apparently only a robust cultivated form of *Z. multiflora*, with verticillate leaves, and double series of rays: said also to come from S. Mexico.

Z. HYBRIDA, Römer & Usteri, Mag. Bot. St. 1 (1787), 49; Curtis, Bot. Mag. t. 2123 (*Z. grandiflora*, Hort. *fide* DC. Prodr. v. 536, not Nutt.), is an annual with deep red rays, greenish disk, and chaff not fringed at the apex: apparently only a form of *Z. multiflora*, with rays becoming broad and somewhat double by cultivation.

Z. AMBIGUA, Salm-Dyck, and *Z. DISCOLOR*, Hort., are names only, and wholly obscure.

IV. — REVISION OF THE MEXICAN AND CENTRAL AMERICAN SPECIES OF THE GENUS CALEA.

CALEA, L., R. Br. (Name of obscure origin. The derivation from *καλός*, beautiful, is unsatisfactory, and at best very doubtful.) — Heads mostly small or of medium size, radiate or discoid. Involucre ovoid, cylindrical, or campanulate; its scales pluriserial, imbricated, usually very unequal, the outer gradually shorter, all scarious or the outer (rarely all) herbaceous or herbaceous-tipped. Receptacle small, convex, or flattish, paleaceous: chaff scarious, concave, rigid or thin and hyaline. Ray-flowers when present fertile; ligules yellow, white, or roseate, entire or denticulate at the apex. Disk-flowers fertile, yellow or white; the limb of the corolla regular, deeply 5-cleft. Anthers appendaged at the apex and shortly sagittate-lobed at the base. Style-branches subtruncate or with a very short appendage. Achenes slender, subterete or more or less distinctly 4-5-angled, usually pubescent: pappus of 4 to 20 subequal scales; these mostly fringed or ciliolate, rarely wanting, when numerous narrow and acuminate or when fewer usually short and blunt. — About 85 species of shrubs and perennial herbs (rarely climbers), extending from Mexico to Tropical S. America. Leaves opposite, simple, mostly ovate, oblong, or lanceolate, sessile or petiolate, mostly

serrate or dentate, rarely entire (in one or more S. American species pinnatifid). The limits of the genus here taken are essentially those of Benthams & Hooker (Gen. ii. 390), and Hoffmann (in Engl. & Prantl, Nat. Pflanzenf. iv. Ab. 5, 246), whose generic synonymy need not here be repeated. The Mexican and Central American species may be subdivided according to the following characters.

Subgenus 1. *LEONTOPHTHALMUM*, Benth. & Hook. f. Heads very large (inch or more in diameter), radiate, few or solitary, long-peduncled: scales of the involucre few-seriate, broad, the outer often herbaceous: both disk- and ray-flowers yellow: scales of the pappus numerous. — Gen. ii. 391. *Leontophthalmum*, Willd. Gesellsch. Natur. Fr. Berl. Mag. 1807, 40; HBK. Nov. Gen. & Spec. iv. t. 409. — Mostly S. American species, only the following known from Mexico.

1. *C. megacephala*. Erect, herbaceous, 2 or 3 feet high: stem striate-angulate, hirsute-pubescent, leafy to the middle and terminating in one or (more rarely) three long naked 1-headed peduncles (often 18 inches in length): leaves thin, ample, hirsute upon both sides, rhombic-ovate or with deltoid acute or obtusish coarsely dentate blade (3 to 4 inches long, nearly as broad) abruptly contracted at the base, then gradually attenuate into a winged entire petiole of nearly equal length; the lowermost leaves smaller, obovate, and with rounded apex: heads, exclusive of rays, 9 to 12 lines in diameter: flowers deep orange; ray-flowers 15 to 20, with oblong spreading ligules half inch in length: disk conical. — Collected by *E. W. Nelson* at Sta. Efigenia, Oaxaca, altitude 500 feet, 18 July, 1895, no. 2844, and on top of ridge back of Tonalá, Chiapas, altitude 1,200 to 2,500 feet, 10 August, 1895, no. 2884. A plant without close affinities in the Mexican species of the genus, but related to several of the S. American.

Subgenus 2. *OTEIZA*, Llav. (as gen.). Heads few or solitary, large, 9 to 15 lines in diameter, loosely cymose or (in *C. elegans*) somewhat densely grouped at the ends of the branches: rays long (nearly or quite half inch in length) white or roseate: leaves sessile or nearly so.

* Leaves oblong, narrowed at the base.

2. *C. Palmeri*, Gray. Herbaceous, erect or slightly decumbent: stem simple or divided almost from the base, pubescent, 18 inches to 2 feet high: leaves 2 to 3 inches long, 4 to 6 lines broad, denticulate and ciliated, 3-nerved: heads 1 to 9, in terminal loose cymes; slender peduncles nearly naked; the floral leaves short and linear: involucre bracts green, few-seriate and more nearly equal than is usual in the genus. — Proc. Am. Acad. xxii. 430. — On the Rio Blanco, Jalisco, *Palmer*, no.

147; on slopes of a barranca near Guadalajara, *Pringle*, no. 2904; and Michoacan, on grassy hills near Patzcuaro, *Pringle*, no. 4125; fl. July.

* * Leaves ovate, abrupt or cordate at the sessile or subsessile base.

3. *C. elegans*, DC. Leaves thickish, quite glabrous above, finely pubescent upon the veins beneath, ovate to ovate-lanceolate, few-toothed, long-acuminate, considerably paler beneath: heads loosely or somewhat closely cymose at the ends of the branches: rays about 8 or 10. — Prodr. v. 674. *Oteiza acuminata*, Llav. Reg. Trim. Mex. 1832, 41. — Valley of San Luis Potosi, *Schaffner*, no. 237, and *Parry & Palmer*, no. 491; and in Tultenango Cañon, State of Mexico, *Pringle*, no. 4297, with heads more aggregated; fl. August till last of October. An imperfect specimen collected by *Bailes*, 1846, in Mexico, without more precise locality, is probably of this species.

4. *C. multiradiata*, Seaton. Herbaceous, erect or decumbent, with habit of the preceding but with sessile leaves thinner, less attenuate, appressed-pubescent upon both surfaces and scarcely paler beneath: heads on very long peduncles, 3 or 4 in number: rays 15 to 20. — Proc. Am. Acad. xxviii. 120. — Wooded slopes of Mt. Orizaba, altitude 10,000 feet, *Seaton*, no. 167, in part. In flower in August. With the type material of this species in the Gray Herbarium were associated specimens of a *Sabazia* and *Tridax* of similar habit.

5. *C. sabazioides*, Hemsl. "Slender herb, 1 to 1½ feet high, procumbent, rooting at the base, in habit very similar to *Sabazia sarmentosa*: leaves decussate, ovate, petiolate, acute, crenate, 3-nerved, hirsute: heads solitary, radiate, as large as in *Tridax*: bractioles [chaff] scarious, uninnerviate, pale fuscous, oblong-ovate, 2-dentate beneath the gradually and narrowly acuminate summit: rays purplish white." — Biol. Cent.-Am. Bot. ii. 206. *Allocaurus sabazioides*, Less. Linnæa, ix. 590. — Near San Miguel del Soldado and La Joya, S. Mexico. No specimens exactly agreeing with this description have been seen by the writers, and the characters are here translated from the Latin of Lessing.

Subgenus 3. EUCALEA, Benth. & Hook. f. (extended). Heads relatively small and numerous, in close corymbs or somewhat umbellate: rays short or none: scales of the pappus 7 to 20: leaves sessile or short-petioled, serrate or dentate (in one species subentire). — Gen. ii. 391.

* Inflorescences terminal, close, on long naked peduncles: upper leaves reduced to small oblong or linear bracts: heads homogamous: pappus often reduced or wholly wanting. — *Calydermos*, Lag.

← Scales of the involucre densely fringed with yellowish glandular-tipped hairs.

6. *C. thysanolepis*. Slender erect herb, 18 inches to 2 feet high: stem simple, striate, densely pubescent, prolonged at the summit into a

nearly naked peduncle bearing a dense cymose cluster of heads: leaves ovate, acute, subcordate at the base, sharply dentate, roughish-pubescent upon both surfaces, 3-5-nerved and coarsely reticulate-veined, 1 to 3 inches long, a third or half as broad, scarcely paler beneath, closely sessile: inflorescence and especially the margins of the 3-seriate involucre scales densely glandular-pubescent: heads about 18-flowered: chaff irregularly erose, often constricted below the summit: achenes calvovous, terete: corolla pubescent. — Collected by *E. W. Nelson* on the summit of the Sierra Madre near Chilpancingo, Guerrero, altitude 9,000 to 10,200 feet, in flower 24 December, 1894.

+ + Scales of the involucre essentially glabrous.

7. *C. peduncularis*, HBK. Erect or decumbent, 1 to 2 feet high, pubescent and usually more or less scabrous: leaves ovate, closely sessile by a broad abrupt or subcordate base, dentate, $1\frac{1}{2}$ to 3 inches long, nearly half as broad: scales of the involucre yellow: pappus present, about two thirds the length of the achenes. — Nov. Gen. & Spec. iv. 295, t. 408. *Calydermos peduncularis*, DC. Prodr. v. 669. *C. scaber*, Lag. Nov. Gen. 25. *Calebrachys peduncularis*, Cass. Dict. Sci. Nat. lv. 277. — South Mexico, Mt. Jorullo, at 3,000 feet, *Humboldt & Bonpland*; *Mirador, Sartorius*; Chiapas, *Ghiesbreght*, no. 783, and *E. W. Nelson*, no. 3261; mountains near Guapimalpatt, Mexico, *Schaffner*, no. 35; Chinantla, *Liebmman*, no. 413; Boerego near Orizaba, *Bourgeau*, no. 3149; Mt. Orizaba, altitude 4,000 feet, *Seaton*, no. 126, and altitude 10,000 feet by same collector, no. 168; also in Orizaba, *Hahn*, no. 2692, *Bilimek*, no. 544, and *Botteri*, nos. 620, 803; Jalapa, *Th. Coulter*, no. 334, in part.

Var. *epapposa*, HBK. Closely similar in foliage and habit: achenes wholly destitute of pappus. — HBK. *fide* DC. Prodr. v. 669. — Near Santa Rosa, acc. to HBK. l. c.; also San Luis Potosi, *Parry & Palmer*, no. 497; Las Canoas in the same state, *Pringle*, no. 3672; Valley of Mexico near the Santa Fé, *Bourgeau*, no. 718; Jalapa, *Th. Coulter*, no. 334, in part, and near Reyes, Oaxaca, altitude 6,700 to 10,000 feet, *E. W. Nelson*; also Mexico without locality, *Th. Coulter*, no. 250, in part (the other part of the same number being a *Eupatorium*); fl. August to October.

Var. *longifolia*, (Lag.) Gray. Leaves lanceolate or lance-oblong, opposite or ternate, relatively much narrower and more elongated; the lower 3 to 6 inches long: scales of the involucre yellow: pappus none. — Proc. Am. Acad. xxii. 430, as to syn. *Calydermos longifolius*, Lag. and Pl. Hartw. *Calydermos scaber*, var. Benth. Pl. Hartw. 346. — Bolaños, *Hartweg*, no. 122, at least as to long-leaved specimens.

Var. livida. Leaves narrow, lanceolate to lance-oblong, very scabrous-pubescent: involucreal scales dark purple: pappus present. — *C. peduncularis*, var. *longifolia*, Gray, as to pl. Palmer. — On the Rio Blanco, Jalisco, *Palmer*, no. 317; and in damp shady cañons near Guadalajara, *Pringle*, no. 2326; fl. August to October.

8. *C. Liebmannii*, Schz. Bip. Branches terete: leaves petiolate, ovate-elliptic, 2 inches long, 9 lines broad, coriaceous, 3-nerved, glabrous above, ferrugineous and chrysopunctate beneath: heads short-pedicelled, 6-flowered, disposed at the summits of the peduncles in umbelliform corymbs: involucre cylindraceous: scales 3-seriate, ovate, subreflexed at the apex: chaff membranaceous, ovate, acute: achenes glabrous; scales of the pappus 10, short. — Leopoldina, xxiii. 6. — Gualulu, *Liebmann*, no. 411. Not seen by the writers, and doubtfully referred to this subdivision. The characters are drawn from the original description of Klatt.

* * Inflorescences more numerous, short-peduncled or sessile, together forming leafy panicles.

← Pappus-scales rather few, ovate to lanceolate, shorter than the achenes.

↔ Inflorescences lax, somewhat umbelliform: pedicels slender and relatively long, most of them considerably exceeding the heads in length.

9. *C. salmeæfolia*, Hemsl. l. c. Shrub, 2 to 3 feet high, with rhombic-ovate leaves acute at both ends, smoothish and lucid above, 1 to 1½ inches long, half as broad: heads 8–14-flowered. — *Calydermos salmeæfolius*, DC. Prodr. v. 670. — Between Tula and Tampico, *Tamaulipas*, *Berlandier*, nos. 718, 2135.

↔ ↔ Inflorescence denser: pedicels mostly very short, seldom equalling or exceeding the heads (except in *C. Zacatechichi*, var. *macrophylla*).

= Involucre of most or all of the heads closely subtended by a few broad obtuse herbaceous bractlets.

10. *C. albida*, Gray. A branching pubescent shrub: leaves ovate, shortly petiolate, serrate, acutish at the apex, abruptly contracted at the broad obtuse base, scabrous above, somewhat paler and moderately pubescent below, 1 to 1½ inches long, two thirds as broad: heads numerous, cymosely clustered at the ends of the leafy branches, on pedicels 1 to 9 lines in length, homogamous or with one or more reduced ray-flowers; flowers whitish: achenes pubescent, scales of the pappus acute. — Proc. Am. Acad. xv. 38. — San Luis Potosi, in mountains near Morales, *Schaffner*, no. 269, and later in the same state, *Parry & Palmer*, no. 448; in fl. in August.

11. *C. hypoleuca*. Similar in habit: leaves somewhat larger, broadly ovate or suborbicular, sessile or very shortly petioled, scabrous

above, densely tomentose and canescent beneath, $1\frac{1}{2}$ to 2 inches in diameter: heads very short-pedicelled or subsessile: scales of the pappus obtuse or rounded at the summit. — Oaxaca, Sierra de San Felipe, altitude 6,000 feet, 7 September, 1894, *Pringle*, no. 5784; dry hills in the Valley of Oaxaca, altitude 5,100 to 5,800 feet, 8 September, 1894, *E. W. Nelson*, no. 1217, and in neighboring locality without date, *Nelson*, no. 1192; also in Valley of Etla, September, 1895, *Alvarez*, (L. C. Smith's) no. 766.

= = Involucre nearly or quite naked, without subtending herbaceous bractlets, or these small and scattered, lanceolate or subulate.

a. Leaves wholly glabrous, quite smooth and free from resinous dots or globules.

12. *C. Nelsonii*. Glabrous, copiously branched and very leafy: leaves rhombic-ovate, coarsely and rather bluntly toothed, 3-nerved, short-petioled, paler beneath, quite smooth but scarcely or not at all lucid upon both sides, $1\frac{1}{2}$ to 2 inches long, half as broad: heads very numerous in many terminal or subterminal close cymes, together forming a considerable pyramidal inflorescence: involucre bracts light colored, striated, obtuse: disk-flowers about 7; ray-flowers 2 or 3, with very short obscure ligules: pappus of about 12 scales. — Collected by *E. W. Nelson* on the top of ridge back of Tonalá, Chiapas, altitude 1,200 to 2,500 feet, 10 August, 1895, no. 2887.

b. Leaves pubescent, or at least covered on the lower surface with resinous atoms.

13. *C. Zacatechichi*, Schlecht. Much branched shrub with harsh scabrous foliage: leaves rhombic-ovate to ovate-oblong, short-petioled, described as deeply crenate, but more often serrate-dentate, acute, cuneate at the base: heads about 12-flowered, very short-pedicelled or sessile in numerous small terminal cymes: scales of the involucre with scarious and undulate margins. — Linnæa, ix. 589; DC. Prodr. v. 672; Hoffm. in Engl. & Prantl, Nat. Pflanzenf. iv. Ab. 5, 246, f. 120, A-C. — On hills near Hacienda de la Laguna and Jalapa, *Schiede*; Mirador, *Sartorius*; Orizaba, *Botteri*, nos. 481, 488; San Pedro Sula, Dept. Sta. Barbara, Honduras, *Thieme* (no. 5300 of Donnell Smith's sets, a form approaching var. *macrophylla*), and Guanagaza, Dept. Sta. Rosa, Guatemala, *Heyde & Lux* (no. 6159 of same sets). The leaves are reputed a remedy for cholera. A form probably of the same species, but having the involucre bracts less scarious-undulate and more often ciliolate, has been collected on hills near Guadalajara, by *Palmer*, no. 352, and *Pringle*, no. 2475. Another form collected by *Pringle* in the Sierra Madre near Monterey, Nuevo Leon, no. 2224, differs only in

having the involucre calyculate with 1 to 3 lanceolate herbaceous-tipped bractlets.

Var. rugosa. Habit, foliage, and inflorescence of the preceding species: heads smaller, 5-10-flowered. — *C. rugosa*, Hemsl. Biol. Cent.-Am. Bot. ii. 206. *Calydermos rugosus*, DC. Prodr. v. 670. — Cuernavaca, Morelos, *Berlandier*, no. 1061; also in Orizaba, *Bourgeau*, no. 3095; near Acapulco, *Palmer*, no. 52.

Var. macrophylla. Leaves mostly much larger, $2\frac{1}{2}$ to 3 inches or more in length, half as broad, less rugose: pedicels often equalling or considerably exceeding the 12-flowered heads: achenes nearly $1\frac{1}{2}$ lines in length, the pappus only a third as long. — Collected by *H. von Tuerckheim* at Coban, Dept. Alta Verapaz, altitude 4,300 feet, February, 1888, and distributed as *C. Zacatechichi* in Donnell Smith's Guatemalan sets, no. 1345; also by *Heyde & Lux*, at Laguna de Ayarza, Dept. Jalapa, altitude 8,000 feet, distributed in same set as *C. salmeæfolia*, no. 3782.

← ← Scales of the pappus narrower, more numerous, equalling or exceeding the achenes.

→ Involucre cylindrical, or narrowly campanulate, rather few-flowered; scales broad, scarious, glabrous or only the outermost herbaceous and somewhat pubescent: pedicels less than an inch in length: plants pubescent.

= Heads numerous, radiate, with ligules evident.

a. Inflorescences terminal, cymose-paniculate or somewhat corymbose: heads very numerous, small: involucre ecalyculate.

14. *C. integrifolia*, Hemsl. Shrub, 4 to 8 feet high: leaves ovate-lanceolate, attenuate at the apex, rounded or obtusish at the short-petioled base, cuspidate-denticulate, varying from papillose-pubescent and very scabrous to smoothish and lucid, 2 to $4\frac{1}{2}$ inches long, a third to half as broad; the veins very prominent beneath: heads 15-20-flowered: disk-flowers yellow; ray-flowers 5, white, destitute of pappus. — Biol. Centr.-Am. Bot. ii. 205. *Allocarpus integrifolius*, DC. Prodr. v. 676. — Originally collected in Mexico without more exact locality by *Karwinski*; later in Mirador by *Sartorius*, by *Liebmann*, no. 418, and by *E. W. Nelson*, no. 86; Chiapas, *Ghiesbreght*, no. 565; Cordova, *Bourgeau*, no. 1751, and *A. Gray*; near Orizaba, altitude 4,000 feet, *Pringle*, no. 5915, and *E. W. Nelson*, no. 2; Oaxaca, on the Sierra de San Felipe, altitude 8,000 feet, *Pringle*, no. 6111; Cieneguilla, *L. C. Smith*, no. 381; between Panixtlahuaca and Jaquila, altitude 1,000 to 5,000 feet, *E. W. Nelson*, no. 2389; City of Mexico, *Mrs. D. H. Sheldon*; Guatemala, at Coban, Dept. Alta Verapaz, altitude 4,300 feet, *von Tuerckheim* (no. 379 of Donnell Smith's sets); Guarda Viejo, Dept. of Guatemala, altitude

5,000 feet, *Donnell Smith*, no. 2345; Teocinte, Dept. Sta. Barbara, altitude 2,500 feet, *Heyde & Lux* (no. 4199 of Donnell Smith's sets); San Rafael, Dept. Zacatequez, altitude 6,500 feet, *Donnell Smith*, no. 2332. One of the commonest species of S. Mexico and Central America.

Var. *dentata*, Coulter. Leaves with more pronounced dentation, long caudate-acuminate: the floral oblong-linear, attenuate. — *Bot. Gaz.* xx. 51. — Nebaj, Dept. Quiche, Guatemala, altitude 7,000 feet, *Heyde & Lux* (no. 4506 of Donnell Smith's sets). Hither we would refer *Nelson's* no. 2513, collected between Suchiatepec and Miahuatlan, Oaxaca.

b. Inflorescences cymose-umbellate in the upper axils, together forming a leafy elongated or thyrsoid panicle: involucre commonly calyculate with one or more herbaceous bractlets.

15. *C. axillaris*, DC. Shrub: leaves ovate-lanceolate or ovate-oblong, attenuate-acuminate, sharply serrate. — *Prodr.* v. 673. *Mocinna serrata*, Lag. Nov. Gen. 31. — Mexico, *Hænke*; Valley of Cordova, *Bourgeau*, no. 1675; between San Luis Potosi and Tampico, *Palmer*, no. 1111. Passes into

Var. *urticæfolia*. Leaves shorter and relatively broader, ovate, acute or acutish to barely acuminate, crenate-serrate. — *Caleacte urticifolia*, R. Br. Trans. Linn. Soc. xii. 109. *Calea urticæfolia*, DC. l. c. 674. — The commoner form, Mexico without locality, *Gregg*, nos. 1002, 1042; Orizaba, *Schaffner*, and *A. Gray*; Wartenberg near Tantoyuca, Huasteca, *Ervendberg*, no. 96 (passing to typical form); Colima, *Palmer*, no. 1215; Jalisco, on rocky slopes near Guadalajara, *Pringle*, no. 1788; and in neighboring locality on Rio Blanco, *Palmer*, no. 675 (robust form with ternate leaves); Guatemala on the Rio Amatitlan, altitude 3,900 feet, *Donnell Smith*, no. 2337, also Jumaytepeque, Dept. Santa Rosa, altitude 6,000 feet, *Heyde & Lux* (no. 3790 of Donnell Smith's sets); Costa Rica at Navarro, altitude 3,500 feet, *Donnell Smith*, no. 4857; Nicaragua, *Wright*.

= = Heads subumbellate at the ends of the branches or from the upper axils, discoid: Chiapas and southward.

16. *C. prunifolia*, HBK. Shrub: leaves broadly elliptic-ovate, crenate, obtuse, abruptly contracted to a subcuneate base, slender-petioled, scabrous and rugose above, somewhat paler and scabrous beneath, 2 to 3½ inches long, two thirds as broad: heads about 18-flowered. — *Nov. Gen. & Spec.* iv. 294, t. 406. — A South American species reaching the Isthmus of Panama, where collected by *Seemann* and later by *Hayes*.

17. *C. trichotoma*, Donnell Smith. Densely fuscous-tomentose: leaves ovate, acutish, crenate-serrate, scabrous above, somewhat canescent-tomentose beneath, 1 to 2½ inches long, one half to two thirds as broad; stems somewhat tortuous as though scandent. — Bot. Gaz. xiii. 299. — Rocky mountain sides near Coban, Dept. Alta Verapaz, altitude 4,300 feet, *von Tuerckheim* (no. 1353 of Donnell Smith's sets); Chiapas, table land about Ocuilapa, altitude 3,400 to 3,800 feet, *E. W. Nelson*, no. 3004.

++ ++ Heads campanulate, many-flowered: scales of the involucre glabrous: leaves very large (2½ inches or more in breadth): pedicels less than an inch in length: Costa Rican species.

18. *C. pellucidinervia*, Klatt. Leaves membranaceous, broadly ovate, 4 inches long, two thirds as broad, long-acuminate, serrate-dentate, rounded at the base; petiole 5 lines long, densely pilose: ligules 6, 2 lines in length. — Bull. Soc. Bot. Belg. xxxi. 207. — In woods at Terraba, altitude 900 feet, *Pittier*, nos. 3707, 3726. A species not seen by the writers; the description is condensed from the original characterization.

++ ++ Heads campanulate, many-flowered: scales of the involucre multiseriate, sub-herbaceous, very pubescent: pedicels half inch or less in length: leaves smaller: Mexican species.

19. *C. scabrifolia*, Benth. & Hook. f. Shrub: leaves ovate-oblong or oblong-lanceolate, attenuate, serrate or serrulate, thickish above papillose-pubescent and very scabrous, below sparingly pubescent, slightly paler and with veins very prominent: pedicels and involucre bracts densely canescent-tomentose: disk-flowers 125 or more; ray-flowers 20 to 25, the latter without pappus: plant drying green. — Benth. & Hook. f. acc. to Hemsl. Biol. Centr.-Am. Bot. ii. 206. *Allocaarpus scabrifolius*, Hook. & Arn. Bot. Beech. 300. *Ferdinanda oppositifolia*, Schz. Bip. in Seemann, Bot. Herald (by error cited as *Zaluzania* by Benth. & Hook. f. Gen. ii. 391). *Perymenium album*, Wats. Proc. Am. Acad. xxv. '54. — N. W. Mexico in Sierra Madre, *Seemann*; Jalisco, on mountains near Lake Chapala, *Pringle*, no. 2438, in fl. December; Alamos, *Palmer*, no. 283.

20. *C. submembranacea*, Fernald. Similar in habit: leaves thinner, nearly smooth and somewhat lucid, somewhat nigrescent in drying. — Bot. Gaz. xx. 535. — On mountain sides, Zopelote, Tepic, altitude 3,000 feet, *Lamb*, no. 554.

++ ++ ++ Heads few; campanulate: scales of the involucre broad, few-seriate, glabrous: pedicels very long (1½ to 2 inches): plant essentially glabrous.

21. *C. longipedicellata*. Shrub, glabrous throughout except the puberulent summits of the long pedicels: leaves elliptical, acutish at both

ends, callous-denticulate, short-petioled, paler beneath, 3-nerved, $1\frac{1}{2}$ to 2 inches long, 9 or 10 lines broad: heads 2 to 4 at the ends of the branches (springing from the opposite axils of the last pair or two pairs of leaves), half inch in diameter, homogamous: outer involucreal scales scarcely shorter than the inner, broadly oblong, rounded at the apex: scales of the pappus linear-attenuate, about 20 in number: achenes glabrous. — Collected by *E. W. Nelson*, near Choapam, altitude 3,800 to 4,500 feet, 28, 29 July, 1894, no. 898.

+ + + Doubtful and poorly characterized species, probably referable to this subdivision and very likely synonymous with some of the foregoing species.

22. *C. cacosmioides*, Less. "Bracteoles [by which is meant apparently the *chaff*] broad, at the apex lacinate, acuminate and aristate: involucre cylindrical, about 12-flowered: differing from *C. solidaginina*, Kunth, not only in the form of the bracteoles, but also in the radiate heads, and in the leaves obtuse at the base or acute but not acuminate into petioles, sharply serrate, subglabrous, lucid above." — Linnæa, v. 157. — In open places near Jalapa, October, *Schiede & Deppe*. The characters translated from the original Latin description.

23. *C. brachiata*, DC. "Shrub: branches brachiate: leaves ovate, obtusely mucronate: heads fasciculate and mostly terminal." — Prodr. v. 673 (whence descr.). *Mocinna brachiata*, Lag. Nov. Gen. 31. *Galinsoega brachiata*, Spreng. Syst. iii. 579. — "In Panamaide" acc. to Lagasca, l. c.

Subgenus 4. *TETRACHYRON*, Benth. & Hook. f. Heads corymbose, radiate: leaves oblong or lanceolate, often with interpetiolar dilation: both disk- and ray-flowers yellow: scales of the pappus only 4. — Gen. ii. 391. *Tetrachyron*, Schlecht. Linnæa, xix. 744.

24. *C. manicata*, Benth. & Hook. f., l. c. A tall glabrous shrub, 8 to 12 feet in height: leaves lanceolate, gradually narrowed at both ends, serrate, 4 or 5 inches long, 9 lines broad, nigrescent in drying: involucre somewhat turbinate-campanulate, ecalyculate: corymbs flat, 2 to 6 inches or more in diameter: rays about 12: scales of the pappus a third to half as long as the achene. — Benth. & Hook. f. acc. to Hemsl. Biol. Cent.-Am. Bot. ii. 206. *Tetrachyron manicatum*, Schlecht. l. c. — Cordillera near Vera Cruz, *Galeotti*, no. 2309; Mirador, *Liebmann*, no. 392, *Dr. Berendt*, and *E. W. Nelson*, no. 85; Orizaba, *Schaffner*, *Botteri*, no. 807; also Sierra del Borrego, above Orizaba, altitude 4,500 feet, *Pringle*, no. 6133.

25. *C. Orizabaensis*, Klatt. Branchlets pentagonal: lower leaves petiolate, large, 5 inches long, 3 inches wide, oblong, sinuate-undulate,

glabrous above, pilose on the nerves beneath: heads pedicellate in lanceolate-bracted corymbs: scales of the involucre biseriate, ovate, striate: rays 4 or 5, oblong; disk-flowers externally pubescent: chaff ovate, scarious, obscurely dentate at the apex: scales of the pappus linear-lanceolate, laciniate at the apex, shorter than the tetragonal hirsute achene. — Leopoldina, xxiii. 6. *Tetrachyron Orizabaensis*, Schz. Bip. *fide* Klatt, l. c. — Peak of Orizaba, altitude 8,000 to 10,000 feet, *Liebmann*, no. 390. Not seen by the writers. Description translated and condensed from the original characterization.

Subgenus 5. *TEPHROCALEA*, Gray. Heads few or solitary, rather large for the genus: scales of the pappus 4 to 5: leaves ovate, entire, abrupt at the base and slender-petioled, canescent-tomentose or -tomentulose beneath. — *Proc. Am. Acad.* xv. 38.

26. *C. discolor*, Gray, l. c. Leaves ovate-oblong, obtusish, mucronulate, glabrous above, very finely tomentulose beneath: heads about 5 at the summits of the branches, 9 lines in diameter including the spreading rays: pedicels long, an inch or more in length, very finely puberulent or nearly smooth. — Mexico without locality, *Th. Coulter*, no. 351. A very distinct species apparently never rediscovered.

27. *C. tomentosa*, Gray, l. c. Leaves ovate, subcordate, rounded at the apex, densely tomentose and canescent upon both surfaces when young but glabrate above: heads solitary, terminal: peduncles very tomentose, rather stout and somewhat thickened upward. — Between San Luis Potosi and Tampico, *Palmer*, no. 1108. Not since collected.

Species of uncertain affinities.

28. *C. sessiliflora*, Less. Shrub: leaves very obtuse or subcordate at the base: heads discoid, about 10-flowered: involucre cylindrical: chaff broad, obovate, muticous at the apex. — *Linnaea*, v. 158. — Mexico, *Humboldt*. A species as yet wholly obscure; the characters are drawn from Lessing's scanty description.

V. — A PROVISIONAL KEY TO THE SPECIES OF POROPHYLLUM, RANGING NORTH OF THE ISTHMUS OF PANAMA.

* Leaves with broad obtuse ovate or elliptic-oblong usually thin lamina, rather abruptly contracted at the base to a slender petiole.

+ Heads very long; involucre scales at maturity 8 to 12 lines in length: peduncles conspicuously clavate: erect scarcely distinct annuals.

1. *P. macrocephalum*, DC. Prodr. v. 648.

2. *P. ruderale*, Cass. Dict. Sci. Nat. xliii. 56.

3. *P. ellipticum*, Cass. l. c.

+ + Heads shorter; involucre scales about half inch in length: peduncles scarcely or not at all thickened toward the summit.

+ + Leaves with pellucid glands on the surface as well as at the margins.

4. *P. Ervendbergii*, Gray, Proc. Am. Acad. xix. 35.

5. *P. nummularium*, DC. l. c. 649.

+ + Glands of the leaves marginal or none.

= Leaves broad, thickish: petioles rather short: probably a single species.

6. *P. viridiflorum*, DC. l. c. 648.

7. *P. Lindenii*, Schz. Bip. in Seem. Bot. Herald, 308.

= = Leaves thin and delicate.

a. Heads nodding or almost pendulous.

8. *P. nutans*. Leafy shrub with slender terete fuscous branches (marked with small light colored lenticels) and almost filiform branchlets: leaves thin, elliptic, entire, or crenulate, obtuse but often mucronulate at the apex, obtuse or acutish at the base, 8 to 14 lines long, half as broad; marginal glands 4 to 6 on each side the leaf; petioles filiform, 3 or 4 lines long: heads numerous, about 9 lines long: peduncles clustered at the ends of the branches in 3's and 4's: involucre scales 5, oblong, obtuse, 6 lines long, somewhat carinate, green, with double row of linear glands: flowers white or nearly so, 9 lines in length; limb of the corolla sub-bilabiate, shallowly toothed: achenes 5 lines in length. — Collected by *C. G. Pringle*, in mountains near Lake Chapala, 16 December, 1889, no. 2976, and by the same collector on rocky hills, Querendaro, Michoacan, 25 October, 1892; later by *E. W. Nelson*, between Chilapa and Tixtla, Oaxaca, altitude 5,200 to 7,000 feet, no. 2170. Mr. Pringle's plants were at first determined as *P. Ervendbergii* and so distributed. On subsequent comparison with that species they appear thoroughly distinct, having only marginal glands on the leaves, nodding instead of erect peduncles, less deeply cleft corolla, and longer achenes.

b. Heads erect: slender annual.

9. *P. Pringlei*, Robinson, Proc. Am. Acad. xxvii. 178.

c. Heads erect: shrubs.

10. *P. Jorullense*, Cass. "Leaves 1 inch long, eglandular: petioles 6 to 7 lines long: scales of the involucre green." Dict. Sci. Nat. xliii.

57. *Kleinia Jorullensis*, HBK. Nov. Gen. & Spec. iv. 156, t. 356, whence description.

11. *P. Nelsonii*. Branching shrub, 1 to 2 feet high: stems terete, striate, purple: leaves chiefly opposite, rather small and distant; blade elliptic or oblong, obtuse, 6 to 8 lines long, 2 to 3 lines broad, rather gradually narrowed to a slender petiole (2 or 3 lines in length); glands few on the margin or often only a single one at the end of the mid-nerve: heads subcorymbose at the ends of the branches, 7 lines long, about 30-flowered; scales of the involucre 5, linear-oblong, acute, purple especially toward the summit, flat, marked with 2 rows of linear glands: corollas dark purple, $3\frac{1}{2}$ inches long: achenes strongly tapering, 3 to $3\frac{1}{2}$ lines in length. — Collected by *E. W. Nelson*, in Oaxaca, between Panixtlahuaca and Jaquila, altitude 5,000 feet, 26 February, 1895, no. 2399; also between Nopala and Mixistepic, altitude 800 to 4,000 feet, March, 1895.

* * Leaves rather broadly lanceolate, acute at both ends, slender-petioled.

12. *P. Palmeri*, Rose, Contrib. U. S. Nat. Herb. i. 338, t. 34.

* * * Leaves narrowly elliptic or linear-oblong, obtuse or obtusish, gradually narrowed to a sessile or short-petioled base.

13. *P. Seemannii*, Schz. Bip. l. c.

14. *P. obtusifolium*, DC. l. c. 650.

15. *P. decumbens*, DC. l. c.

* * * * Leaves lance-linear, sessile, and amplexicaul.

16. *P. amplexicaule*, Engelm. in Gray, Pl. Wright. i. 120.

* * * * * Annuals or more commonly perennials, often shrubby at the base: leaves very narrow; truly linear or subulate, or lance-linear and acute or acutish, sessile or subsessile, but not amplexicaul.

+ Mexican species: corolla shallowly and regularly 5-toothed; teeth deltoid: achenes $2\frac{1}{2}$ to $3\frac{1}{2}$ lines long: involucreal scales green or glaucous, not dark purple.

17. *P. scoparium*, Gray. Leaves truly linear or terete, half a line in breadth: peduncles inch or more in length. — Pl. Wright. i. 119.

18. *P. pausodinum*. Shrub: stems geniculate, branched, covered with smooth reddish brown cortex: branchlets straight, erect, sulcate-angulate, glaucescent: leaves scattered, linear-lanceolate, narrowed to an obtusish apex, attenuate at the base to a short petiole, slightly succulent,

3-nerved, slightly reticulated, 2 inches long, 2 to $2\frac{1}{2}$ lines broad, entire; marginal glands elliptical, usually 2 or 3 on each side and often one at the end of each leaf: heads 6 to 8 lines long, 25–30-flowered, rather densely clustered in terminal flat-topped leafy cymose corymbs (2 or 3 inches in breadth); individual peduncles shorter than the heads: scales of the cylindrical involucre 5, oblong, obtuse or rounded at the apex, 5 lines long, 1 to $1\frac{1}{2}$ lines broad, pale green, with a double line of dark linear glands near the middle: flowers white. — *P. Seemannii*, Wats. Proc. Am. Acad. xxiv. 57; Brandege, Zoe, i. 313; not Schz. Bip. — Collected by Dr. Edward Palmer in crevices of exposed rocks in high mountains near Guaymas, Sonora, 1887, no. 279 (distributed as *P. Seemannii*, var.). According to Dr. Palmer's notes the plant is called *Maravilla* by the Mexicans and used for headache.

+ + Mexican species with corolla more deeply cleft and more or less distinctly bilabiate; teeth lanceolate; achenes $2\frac{1}{2}$ to $3\frac{1}{2}$ lines in length.

↔ Achenes long and slender, tapering at the apex, about 4 lines long.

19. *P. gracile*, Benth. Leaves fleshy, subterete. — Bot. Sulph. 29.

20. *P. n. sp.?* aff. *P. gracile*. Leaves not fleshy, flat, very narrowly lance-linear, 1 to 2 inches long, a line or two broad, with regular marginal glands: heads solitary, terminal on very short slender peduncles: cylindrical involucre green, slender; scales with purple border and glands. — A tall slender, much branched leafy plant collected at Fronteras, Sonora, by C. V. Hartman, altitude 4,550 feet, 25 September, 1890, no. 8.

↔ ↔ Achenes shorter, 2 to 3 lines long: involucre very dark-purple, often pruinose-glaucous.

= Spreading annuals: very likely a single species.

21. *P. coloratum*, DC. Prodr. v. 650.

22. *P. tagetoides*, DC. l. c.

= = Perennials, a little shrubby at the base.

a. Involucral scales obovate, very broad and obtuse.

23. *P. filifolium*, Gray, Proc. Am. Acad. xviii. 107, xix. 35.

b. Involucral scales narrower, oblong.

24. *P. Linaria*, DC. l. c. 649.

+ + + Lower Californian shrubs, with geniculate and much branched stems, short subulate fleshy leaves, and short many-flowered heads: achenes only $1\frac{1}{2}$ lines in length.

25. *P. crassifolium*, Wats. Proc. Am. Acad. xxiv. 57.

26. *P. tridentatum*, Benth. Bot. Sulph. 30.

VI.—DESCRIPTIONS OF NEW OR LITTLE KNOWN PHANEROGAMS, CHIEFLY FROM OAXACA.

Discorea composita, Hemsl. Mr. E. W. Nelson has rediscovered this species at Santa Efigenia, Oaxaca, altitude 500 feet, 18 July, 1895, no. 2828, and also between Topana, Oaxaca, and Tonalá, Chiapas, altitude 200 to 500 feet, 1 to 3 August, 1895, no. 2855. The specimens from Santa Efigenia represent the hitherto unknown staminate plant from which the following supplementary characters are derived: foliage and inflorescence of the ♂ plant as in ♀: segments of perianth 6, oblong, obtuse; the inner slightly larger: stamens 6, all perfect, free from each other and borne upon the base of the perianth-segments, the three opposite the outer segments a little shorter than the others: filaments not noticeably rigid nor flattened, considerably exceeding the very short anthers: the interior of the flower containing a conical rudimentary ovary.

Habenaria subauriculata. Glabrous, 5 to 10 inches high: tuberiform root single, ovoid, an inch long: stem flexuous, leafy: leaves ovate, acutish or acute, 3-ribbed, sheathing by the slightly narrowed base, 1 to 1½ inches long, a third or half as broad: spike 2 to 6 inches long, several-many-flowered: bracts ovate-lanceolate, acuminate, about equalling the ovary: flowers green: upper sepals 3-nerved, about 3 lines long, obtusish, the upper broadly ovate, galeate, obtusish, 3-nerved, 3 lines long; the lateral ones narrowly ovate, obtusish, slightly exceeding the upper one: lateral petals linear-oblong, obtusish, slightly falcate, subauriculate on the lower side at the base, otherwise entire, 2 to 2½ lines long; labellum deeply 3-parted, the divisions linear, the lateral divaricately spreading and slightly curved upwards, 2½ to 3 lines long, about equalling the middle lobe: spur slender, scarcely clavate, green, about 4 lines long.—Collected by C. G. Pringle, on grassy slopes, Las Sedas, Oaxaca, altitude 6,000 feet, August, 1894, no. 4830. Habit of *H. flexuosa*, Lindl., and *H. clypeata*, Lindl., but with lateral petals undivided.

Spiranthes Oaxacana. Glabrous (except flowers): root a fascicle of numerous thickened tuberiform fibres: stem erect, a foot to a foot and a half high bearing 1 or 2 foliar leaves at the base and loosely sheathed for the rest of its length by membranaceous striate-veiny ovate-acuminate bracts: leaves oblong, 3 inches or more in length, three fourths inch in breadth, sheathing at the narrowed base, scarcely persisting until the perfecting of the flowers: flowers in a dense ovate subcapitate spike, slightly exceeding the conspicuous ovate-acuminate

silvery diaphanous brown-veined bracts: sepals finely pubescent on the outer surface; the lateral sepals linear-oblong, 6 lines in length, obtuse, 3-nerved, not fleshy; the dorsal one ovate-lanceolate, obtusish, about the same length: petals linear-oblong, obtusish, 3-nerved, about equalling the sepals; labellum long-unguiculate; lamina oblong, 5 lines in length (about equalling or slightly exceeding the claw), $3\frac{1}{2}$ lines broad, with a median lance-shaped callous thickening just above the thickish claw; the latter involute on the margin and somewhat sulcate above. — Collected by C. G. Pringle, on hills above San Felipe, Oaxaca, altitude 6,000 feet, 31 December, 1894, no. 6101.

Cranichis thysanochila. Glabrous throughout, 6 to 8 inches high: roots several, elongated, thick, tuberiform, obtuse, covered with fine short rootlets: leaves basal, ovate, acute, thin, smooth, $1\frac{1}{2}$ to 3 inches long, half to two thirds as broad, subsessile; the contracted base membranous, amplexicaul: stem slender, flexuous, bearing about 5 lanceolate attenuate sheathing green bracts: spike 2 to 4 inches in length, only moderately dense: floral bracts ovate-lanceolate, sharply acuminate, green, 3 lines in length, about equalling the ovary: flowers spreading, nearly half inch in length: floral envelopes white; sepals oblong, obtuse, 1-nerved, subequal, about 2 lines in length; lateral petals broadly spatulate or narrowly obovate, obtuse, 1-nerved, about equalling the sepals in length; lip superior, obovate, cuneate, short-clawed, biauriculate at the base, terminated at the apex by an emarginate and fimbriated appendage; the inner surface longitudinally somewhat 2-crested. — Collected by C. G. Pringle, on calcareous banks, Las Hoyas Cañon, Oaxaca, altitude 4,500 feet, 2 November, 1894, no. 6023. This species differs from others of the genus in the fringed apex of the lip.

Microstylis platyglossa. Erect, a foot high, glabrous, 1-leaved: bulb three fourths inch in diameter: sheath subsolitary, short, obtuse: leaf oval, amplexicaul at the subcordate base and rounded or very obtuse at the apex, $1\frac{3}{4}$ to $2\frac{1}{2}$ inches long, 15 to 18 lines broad: peduncles about 2 inches long; racemes 6 to 8 inches long, bracts ovate, acute, a third to half as long as the slender pedicels, these nearly horizontal, $1\frac{1}{2}$ lines long: flower purple (the labellum sometimes lighter colored), inverted by the torsion of the pedicels, bringing the labellum downward: sepals oblong, obtuse, 1-nerved, about a line long, the upper odd one erect, the lower pair reflexed: lateral petals linear, reflexed; labellum broadly deltoid, one third broader than long, obtuse, about a line in length, dark purple or yellow (both colors sometimes occurring on the same specimen). — Collected by C. G. Pringle, on the Sierra de San Felipe, Oaxaca,

altitude about 10,000 feet, August, 1894, nos. 5614, 5614a, and by E. W. Nelson, in the same locality, no. 1140.

Microstylis streptopetala. Slender, 6 to 18 inches high, 1-leaved: bulb oval, half inch in diameter; sheaths 2, closely surrounding the base of the stem, obtuse: leaf elliptic-oblong, cuneate at the amplexicaul base, acutish or obtuse at the apex, $1\frac{1}{2}$ to 3 inches long, 4 to 8 lines broad: naked and angled peduncle about equalling the stem (2 to 4 inches in length): spicate inflorescence strict, slender, 2 to 8 inches long, 2 to 3 lines in thickness, very densely flowered above but looser below: bracts very short ovate-deltoid, obtusish: flowers sessile: sepals 3-nerved, green, oblong, obtuse, the upper somewhat falcately incurved, $1\frac{1}{2}$ lines long, green; lower 2 lines long: lateral petals linear, spirally coiled or twisted, greenish white; labellum deltoid, strongly auriculate, minutely 3-toothed at the apex, half as long as the upper sepals, in dried state nearly black; margins somewhat thickened and slightly incurved; auricles oblong and obtuse.—Collected in flower by C. G. Pringle on dry pine ridges, Sierra de San Felipe, Oaxaca, at 9,000 to 10,000 feet altitude, 30 July, 1894, no. 4808. Most nearly related to *M. montana*, Roth, but with very different lip.

Phoradendron Forestieræ. Glabrous throughout: branches terete, olive-green; branchlets ancipital: leaves narrowly oblong, with rounded apex and cuneately narrowed base, sessile, 1-nerved, or very obscurely 3-nerved, yellowish green, inch to inch and a half long, $1\frac{1}{2}$ to $2\frac{1}{2}$ lines wide: inflorescences of ♀ plant axillary, solitary, opposite, moniliform, 5 to 9 lines in length, flowers in 1 to 4 globular 10–12-flowered clusters, becoming deeply imbedded in the substance of the nodular rhachis; the clusters $2\frac{1}{2}$ lines in diameter, tawny in color; the intervening necks 1 to $1\frac{1}{2}$ lines long, about half enveloped in a loose sheath; the margins of the sockets holding the flowers finely ciliolate: divisions of the perianth 3 (rarely 4), deltoid, the free portion not a third of a line in length.—Collected by C. G. Pringle on hills between Tehuacan and Esperanza, Puebla, altitude 6,000 feet, 23 December, 1895, no. 6290. A species parasitic on *Forestiera*, and apparently most nearly related to *P. brachystachyum*, Oliv., which, however, is tomentulose on the branchlets, has simple not moniliform inflorescences, and larger more distinctly veined leaves.

Euphorbia Luciismithii. Tall branching tomentulose glaucous shrub, 10 to 15 feet in height: branches subterete, striate: leaves verticillate, 2–5-nate, elliptical, obtuse at both ends or subacute at the base, glabrous or glabrate above, paler and soft grayish-tomentulose beneath,

10 to 16 lines long, a third to half inch broad: petioles 4 to 6 lines long, tomentulose: cymes compound, terminal, flat-topped, leafy: floral leaves oblanceolate, cuneate, mucronulate, 1-nerved, white or rarely red, about 3 lines in length, a line in breadth: involucre campanulate, puberulent, nearly sessile; lobes 5, fimbriated; glands 5, oblong; appendages oblong or subrotund, undulate, white, three fourths line long: capsules 3-lobed, nearly 3 lines long, glabrous seeds ashy, oblong, somewhat 4-angled, faces rugulose and marked with fine irregular brown lines. — Collected by Lucius C. Smith, at Rancho de Calderon, altitude 5,500 feet, 13 August, 1894, no. 181; also at Jaycatlan, altitude 4,300 feet, 10 September and 4 November, 1894, no. 182; also by C. G. Pringle, in rocky gulches, Monte Alban, Oaxaca, altitude 5,800 feet, 14 September and 27 November, 1894, no. 4903, and by E. W. Nelson, six miles above Domingullo, altitude 4,500 to 5,500 feet, 30 October, 1894, no. 1880. Most nearly related to *E. leucocephala*, Lotsy, from which it differs in pubescence and form of appendages.

Euphorbia Oaxacana. Stems subterete, 2 to 5 feet high, green, rather densely pubescent near the summit, soon glabrate: leaves alternate, ovate-elliptic, entire, thin, obtuse at each end, appressed-villous on both sides and ciliated, 10 to 16 lines long, half as broad; slender soft-pubescent petioles becoming half inch in length: inflorescence a long narrow compound somewhat secund naked panicle: its leafless branches alternate, 1 to 3 inches in length, again branched and rather densely flowered, tomentose; buds roseate, tomentose: involucre in subcapitate peduncled cymes, white-tomentose as well as the short (1 to $1\frac{1}{2}$ lines) linear-spatulate branchlets; glands 5, equal, oblong, with white subrotund or oblong 2-3-crenulate appendages (about a line long); involucre lobes fimbriate, green: styles deeply 2-parted; capsule green, glabrous, $1\frac{1}{2}$ lines in diameter: seeds oval, ashy, faveolate. — Collected by C. G. Pringle, on ledges, Monte Alban, Oaxaca, altitude 5,800 feet, 23 November, 1894, no. 6070.

Euphorbia subcærulea. Erect much branched annual, glabrous throughout, 2 feet in height: stem and slender branches terete, striate, livid: leaves elliptic-ovate, entire, thin, green above, a little paler and glaucescent beneath, rounded or very obtuse at the base, rounded or retuse at the apex, 3 to 8 lines long, nearly two thirds as broad: petioles filiform, nearly equalling the leaves: inflorescences open cymose-paniculate: floral leaves very small, elliptic-ovate to subrotund, subsessile, white or bluish: involucre (including appendages) $1\frac{1}{2}$ lines in diameter; glands 5, oblong, sessile, with suborbicular entire appendages, these at

first light blue, then changing to white, half line in diameter, spreading: stigmas deeply 2-parted; divisions clavellate: capsule smooth, about a line in diameter: seeds oblong, light blue, three fourths line in length, deeply pitted and with a conspicuous caruncle. — Collected by C. G. Pringle, on dry banks, Tomellin Cañon, Oaxaca, altitude 3,500 feet, 9 December, 1895, no. 6265.

Cardiospermum Galapageium. A slender climber with furrowed tomentulose stem and biternate leaves: leaflets oblong-lanceolate, attenuate, entire, abrupt at base, finely tomentose upon both surfaces, slightly paler beneath, prominently 1-nerved and pinnately veined, the lateral leaflets of each division much smaller than the terminal: peduncles slender, spreading, tendrilliferous beneath the umbelliform inflorescence: sepals 4, the outer pair a line, the inner 2 lines long: glands upon the upper side of the disk short, rounded, not at all cornute. — *C. Corindum*, Rob. & Greenm. Am. Jour. Sci. ser. 3, L. 145, in part, not L. — Collected in the southern part of Albemarle Island, July, 1891, by Dr. G. Baur, no. 61. Distinguished by its narrow entire leaflets. *C. integerrimum*, Radlk., the only other species with similar foliage, known to the writers, has a 5-sepaled calyx and cornute glands.

Erythraea retusa. Erect glabrous annual, 6 or 8 inches in height: stem leafy, 4-angled, branched; branches erect or nearly so, mostly rather short and again branched: leaves oblong-elliptical, obtuse or mucronulate at the end, somewhat narrowed at the base, half inch long, 2 to 3 lines broad, the uppermost narrower and lanceolate: pedicels both terminal and lateral on the branches, short, 1 to 2 lines in length: flowers 4-merous, calyx-lobes lance-linear, attenuate, slightly carinate, 2 lines in length, green with narrow scarious diaphanous margins: corolla-lobes oblong, retuse, a line long, pale yellow in a dried state: fruit dark brown, $2\frac{1}{2}$ lines long. — Collected by C. G. Pringle, in springy meadows, Sierra de San Felipe, Oaxaca, altitude 7,500 feet, 11 December, 1895, no. 6300. This species differs from *E. divaricata*, Schaffner, in its much shorter pedicels and erect not widely spreading branches; from *E. tetramera*, Schiede, in its retuse by no means acute corolla-lobes: from *E. stricta*, Schiede, in its 4-merous flowers. The flowers are small and appear to remain closed and to be cleistogamous.

Nama Pringlei. Low slender branching annual of similar habit to the following and with similar pubescence: leaves oblong, entire, rounded at the apex, rather gradually narrowed at the base to a short slender petiole: calyx as in the last: corolla showy, 5 lines long and equally broad, with short yellow tube and deep blue spreading rather deeply 5-lobed

limb: styles a line long: capsule rugose, broadly ovate with depressed summit. — Collected by C. G. Pringle, on hills near Tehuacan, Puebla, altitude 5,500 feet, 24 December, 1895, no. 6286. A very attractive species, nearly related to *N. latifolium*, Gray, but with much longer calyx and larger corolla as well as different pubescence.

Nama Pueblense. Slender weak dichotomously branched annual, 3 to 6 inches high, spreading-pubescent: leaves ovate, obtuse, entire, thin, 10 to 12 lines long, half as broad, rather abruptly contracted to a slender petiole and covered on both surfaces with fine sub-appressed hairs with globular bases; and below with short golden yellow pedicelled glands: flowers short-pedicelled, grouped by 2's or 3's near the axils or extra-axillary and solitary somewhat above the fork of the terete purplish stem: calyx-lobes in fruit 4 lines in length, spatulate, densely hirsutulous with spreading white hairs: corolla small, pale blue (in dried specimen), tubular, with scarcely amplified shortly 5-lobed limb, 2 to 2½ lines long: styles half line in length: capsule narrowly oblong, hispidulous near the apex, rugose, about 2 lines in length, obtusish: seeds brownish, rugose. — Collected by C. G. Pringle, on hills near Tehuacan, Puebla, altitude 5,500 feet, 24 December, 1895, no. 6287. Habitally near to *N. latifolium*, Gray, but differing in its much longer more hirsute calyx, narrower capsule, and having leaves evenly pubescent over the entire surface instead of chiefly on the veins.

Berendtia levigata. Shrub 2 to 3 feet high, glabrous but somewhat vernicose especially upon some of the younger parts: stems and branches covered with a gray bark; branchlets very leafy especially at the ends: leaves rather broadly lanceolate or oblanceolate, sharply few-toothed above the middle and acute, cuneate to an entire short-petioled base, glabrous or (under a lens) slightly pulverulent but green on both surfaces and sometimes a little lucid, of firm texture, 1¼ to 1½ inches long, half as broad: peduncles opposite in the upper axils, 1-flowered, bibracteolate at or below the middle, the bractioles bearing rudimentary buds in their axils: calyx strongly prismatic, as in *Mimulus*, 6 lines in length, with 5 short broad subequal acuminate-mucronate teeth: corolla showy, much exserted, 1½ inches in length; throat rather gradually amplified, orange with crimson spots; limb patulous, of broad rounded lobes: stamens scarcely exserted: capsule 6 lines in length. — Collected by C. G. Pringle, on calcareous hills near Tehuacan, Puebla, altitude 5,500 feet, 24 December, 1895, no. 6294.

Castilleia aurea. Slender annual of § *Epichroma*, a foot high, with terete glabrous flexuous branched stems and delicate pectinate

foliage: leaves inch to inch and a half long, with 6 to 9 filiform-linear segments and narrow rachis: flowers 9 lines in length, in long rather dense puberulent racemes; lower bracts much like the leaves, the upper gradually reduced to small lanceolate or subulate scales; pedicels erect, slender, 2 to 4 lines long: calyx funnel-form, gradually and considerably amplified, with broad orifice oblique, scarcely split ventrally and not at all dorsally, about half inch in length, golden yellow: corolla concolorous, about 9 lines in length, puberulent upon the considerably exerted galea: capsule ovate-oblong, acutish, 3 lines in length. — Collected by C. G. Pringle, on wet bluffs of barrancas above Cuernavaca, State of Morelos, altitude 7,000 feet, 19 November, 1895, no. 6204. Nearly related to *C. tenuifolia*, Mart. & Gal., and *C. gracilis*, Benth., but distinguished from the former by its yellow flowers, more dense and continuous inflorescence, narrower acuter capsule, and smaller seeds; from the latter by the color of the flowers and much more exerted galea, denser racemes, etc.

Carlowrightia glandulosa. Low much branched shrub, 1 to 3 feet in height, densely glandular-tomentose and viscid: cortex of the older branches pale gray: leaves ovate, acute, entire, cordate, soft-pubescent upon both surfaces, the larger ones 12 to 15 lines in length, three fourths as broad, the floral ovate-lanceolate to lanceolate, half inch in length, somewhat acute at the base: petioles nearly or quite half the length of the leaf: flowers 1 to 4 in the opposite axils, closely sessile: calyx-tube very short, divisions narrowly linear-attenuate, 3 lines in length, glandular-pubescent: corolla bluish, 4-parted; the emarginate posterior lobe purple-veined and marked with yellow at the centre; tube 2 lines long; lobes 4 to 5 lines in length: capsule glabrous and lucid, three fourths inch long, with pungent tip, seeds orbicular, dark brown with lighter colored margin, $2\frac{1}{2}$ lines in diameter. — Collected by C. G. Pringle at Monte Alban, near Oaxaca, altitude 5,500 feet, 5 December, 1895, no. 6276. This species is nearest *C. pubens*, Gray, but differs from it most obviously in its cordate and considerably larger lower leaves, as well as larger flowers and seeds.

Carlowrightia (?) *Pringlei*. Shrub, 3 to 5 feet high, with slender glabrous terete stems covered with smooth grayish brown cortex: leaves ovate-lanceolate, acute, entire, rounded at the base, glabrous on both surfaces or minutely strigillose on the veins beneath, 8 to 12 lines long, a third as broad; petioles a fourth inch long, glabrous but often with a tuft of white hairs at the base within: floriferous branches slender, recurved: flowers sessile, second, solitary or 2 together in the same axil, the opposite axil being empty: bracts small, subulate: calyx-tube very short;

segments 5, linear-attenuate, glandular-pubescent, $1\frac{1}{2}$ lines long: corolla bluish white (in dried specimen): tube slender, 4 to 6 lines long, about equalling the 4 lobes: anther-cells equal and subcontiguous, muticous: capsule glabrous, half inch in length. — Collected by C. G. Pringle, dry slopes, Tomellin Cañon, Oaxaca, altitude 3,500 feet, 30 November, 1895, no. 6261. A plant which with about equal propriety might be referred to *Dianthera*.

Jacobinia candicans, Benth. & Hook. f. "Gen. ii. 1115" according to Hook. f. & Jacks. Ind. Kew. i. 1246. *Dianthera candicans*, Benth. & Hook. f. "Gen. ii. 1113" according to Hemsl. Biol. Cent.-Am. Bot. ii. 517. *Adhatoda candicans*, Nees in DC. Prodr. xi. 396. *Jacobinia Mexicana*, Hemsl. l. c. 521, as to plants of Galeotti and of Liebmann. Excellent and copious material of this doubtful plant has now come to hand from the following sources. Vicinity of Cuicatlan, Oaxaca, altitude 1,800 to 2,500 feet, E. W. Nelson, no. 1698, and in same locality V. González, no. 48; also in Tomellin Cañon, altitude 2,500 feet, C. G. Pringle, nos. 5638, 6260. The plant is a shrub 3 to 5 feet high with the whole habit and inflorescence as well as corolla of *Jacobinia*, to which it would seem best to refer it notwithstanding its slightly disjoined anther cells. Indeed the very close habitual resemblance between this species and *Jacobinia Mexicana* has led to a confusion of the two for Mr. Hemsley in the places cited ascribes Galeotti's no. 911 both to *Dianthera candicans* and *Jacobinia Mexicana*. The plants of recent collection mentioned above correspond in all points to Liebmann's specimen from Tehuacan, and differ much in calyx and bracts from Seemann's plant of N. W. Mexico. In the latter plant (*J. Mexicana*, Seem.) the bracts are minute, much shorter than the 5-toothed calyx. In the former (*J. candicans*) the bracts about equal the calyx and this is much more deeply 5-cleft. The corolla of *J. candicans* is bright scarlet rather than purple as described by Nees.

Oldenlandia xestosperma. Erect glabrous perennial, several-stemmed from a slightly ligneous base: stems terete, moderately branched above, 1 to 2 feet high: leaves linear, 1-nerved, an inch to an inch and three fourths in length, less than a line in breadth: inflorescences terminal few-flowered cymes; bracts small, subulate; pedicels filiform, 1 to 3 lines in length: flowers strongly heterogone-dimorphous: calyx-lobes in anthesis but half line long, subulate, about equalling the tube: corolla purplish, nigrescent in drying, 4 lines in length, gradually widened from the base; limb of 4 triangular erect teeth: capsule obovate, 2 lines in length, entirely inferior, dehiscing to the base: seeds slightly angled,

light colored, yellowish, highly polished and shining, half line or less in diameter. — Collected by C. G. Pringle in open glades, Sierra de San Felipe, Oaxaca, altitude 8,000 feet, June, 1894, no. 4692. Habit of *Houstonia purpurea*, var. *tenuifolia*.

Eupatorium eriocarpum. Stem tall, 5 to 8 feet in height; branches glabrate, angled, lucid, yellowish brown; branchlets puberulent but soon glabrate: leaves opposite, ovate or rhombic ovate, crenate-serrate, acuminate to an obtusish apex, cuneate or rather abruptly contracted at the mostly unequal-sided base, glabrous on both surfaces except on the veins and at their axils, 2 to 3 inches in length, a third to half as broad, neither coriaceous nor rugose, scarcely paler beneath, pinnately veined; petioles 2 to 3 lines long: thyrsoid inflorescences terminal on the upper branchlets and together forming large ovate leafy panicles; slender peduncles and short pedicels often nodding, covered with fine and somewhat sordid pubescence: heads mostly 5-flowered, 5 to 6 lines in length: scales of the involucre ovate to ovate-oblong, obtuse, finely striate, ciliolate, imbricated in 3 or 4 series: corolla-tube slender, 2½ lines in length, larger at the base than at the summit, without any apparent throat; teeth very short: style branches dark colored, strongly clavate: achenes turbinate, so densely covered with white woolly or silky pubescence as to obscure their 5 angles, about 2 lines in length, narrowed at the base to a glabrous callous and somewhat pungent lip; pappus-bristles white, slightly exceeding the achene, about 50 in number. — Collected by C. G. Pringle, in Tomellin Cañon, Oaxaca, altitude 3,000 feet, 22 December, 1894, no. 6112.

Eupatorium rupicola. Shrub, 5 to 10 feet in height: branchlets reddish brown, terete, finely and densely fuscous-puberulent: leaves opposite, petiolate, ovate, acuminate, crenate-serrate, 3-nerved, rounded or obtusish at the base, green and sparingly puberulent or glabrate above, paler and grayish-tomentulose beneath, 14 to 18 lines long, 7 to 12 lines broad; petioles reddish, puberulent, 3 lines long: inflorescences 6–10-headed flat-topped umbelliform corymbs terminating short opposite lateral and terminal branchlets (1 to 2 inches in length), and together forming more or less elongated leafy panicles; pedicels densely pubescent, ascending, 2 to 4 lines long, subtended at the base by very reduced leaves and often bearing one or more short subulate bractlets: heads 3½ to 4 lines in height; involucre relatively short, imbricated in about 2 series; scales 10 to 15, subequal, 1½ lines in length, oblong, acutish, puberulent; flowers about 16, purplish white: corolla 2½–3 lines, gradually enlarged upward: achenes linear, a little over a line in length, rather densely white-pubes-

cent. — Collected by C. G. Pringle on dry ledges of the Sierra de San Felipe, Oaxaca, altitude 7,500 feet, 9 October, 1894, no. 4970.

Chrysopsis Brandegei. Low villous perennial, 3 to 5 inches high, with spreading branched scaly rootstock and numerous densely tufted stems: leaves spatulate, entire, gradually narrowed below into slender petioles, rounded at the summit but mucronate-acuminate at the very apex, 1-nerved, finely grayish-pubescent and covered with very short yellowish glandular or resinous-tipped hairs (so short as to appear when viewed from above merely as sessile globules), and spreading-villous on the edges, 7 or 8 lines long including the petioles; lowest leaves shorter, densely crowded at the base, and often canescent with more appressed pubescence: peduncles terminal, slender, erect, flexuous, terete, $1\frac{1}{2}$ to 2 inches long, villous with spreading hairs and also closely covered with the minute glandular hairs, entirely leafless but sometimes bearing one or two short filiform bracts: heads solitary, discoid, 6 to 8 lines in diameter, half inch in height, 40–45-flowered: scales of the involucre very unequal, imbricated in about 4 series; the outer ones very small, a line in length, very villous, the inner oblong, purplish, rather abruptly but acutely pointed, flat and smoothish, ciliolate on the margin, $3\frac{1}{2}$ lines long, half to two thirds line broad: corollas 5-toothed, golden yellow, glabrous, 4 lines long: pappus manifestly double, the outer bristles very unequal: stigmas sometimes 3: achenes (immature) densely silky-villous, about a line long. — *Chrysopsis* sp., Brandegee, Zoe, iv. 206. — Collected by T. S. Brandegee at San Pedro Martir, Northern Lower California, May, 1893.

Bigelowia pyramidata. Shrub, 2 to 3 feet high, much branched: branches white-woolly; branchlets striate: leaves fascicled, linear-acicular, entire, somewhat pungent, white-woolly beneath, strongly revolute at the margins, pale green and grooved above, 4 to 14 lines long, half line in breadth: inflorescences terminal pyramidal panicles: heads small, numerous, sessile or subsessile, spicately arranged along the spreading-ascending branches, subtended by fascicles of short spreading pungent leaves, discoid, few (5–7)-flowered: scales of the involucre linear-lanceolate, acute, scarious, diaphanous: flowers pale yellow, pappus scarcely tawny, of numerous fine unequal bristles; young achenes silky, the mature not seen. Collected by C. G. Pringle, on hills above Oaxaca, altitude 5,500 feet, 16 November, 1894, no. 6048. A species anomalous in its spicate-paniculate inflorescence but with the other characters of *Bigelowia*.

Lagascea tomentosa. Rather stout: stem subsimple, terete,

tomentose, also somewhat glandular and villous, purplish: leaves ample, ovate, acuminate at the apex, acute at the petiolate base, dentate, tomentose on both surfaces, pale beneath, 3 to 5 inches long, nearly $1\frac{1}{2}$ to 2 inches broad, scabrous on the margins: petioles 4 or 5 lines long, densely pubescent: inflorescences enveloped in ovate-lanceolate acuminate pubescent and ciliate bracts (6 to 8 lines long, 2 to 3 lines broad): involucre numerous, closely aggregated, villous, 3 lines in length, 1-flowered, unequally dentate, glandular in lines: corolla long, 6 lines in length, externally pubescent, the ampliate cylindrical throat exceeding the limb and the more slender proper tube: mature achenes not seen. — Collected by E. W. Nelson between Ayusina and Petatlan, Guerrero, altitude 5,000 to 7,000 feet, 14 December, 1894, no. 2121.

Trigonospermum tomentosum. Stout branching pubescent herb: stem terete, brownish or dark colored: leaves rhombic-ovate, 3-nerved from above the abruptly contracted then cuneately narrowed base, serrulate, acuminate, green and becoming scabrous above, paler and densely tomentose beneath, including the narrowed petiole-like base, 4 to 8 inches long, half as broad: inflorescence a much branched cymbose panicle, densely covered with short dark glandular-tipped hairs; bracts subulate: heads half inch in diameter: involucre scales about 2-seriate; the outer oblong, acutish, 3-nerved, ciliated; the inner broadly obovate, abruptly acuminate: ray-flowers 5; ligules broad, reversed-deltoid, deeply 3-lobed, bright orange-yellow, $3\frac{1}{2}$ lines long; disk-flowers about 25, concolorous: chaff hyaline, obovate-cuneate to suborbicular, ciliated. — Collected by E. W. Nelson on the western slope of Mt. Zempoaltepec, Oaxaca, altitude 7,700 to 8,000 feet, 5 to 13 July, 1894, nos. 610, 617, and later between Panixtlahuaca and Jaquila, altitude 1,000 feet, 26 February, 1895.

Montanoa macrolepis. Stem, 3 to 5 feet in height, terete, fuscous, glabrous or somewhat pubescent: leaves opposite, sinuately 3-lobed; the lamina 3 to 5 inches long, 2 to 3 inches broad, very scabrous-pubescent above, somewhat paler and sparsely pubescent or glabrate beneath, 3-nerved above the base, and contracted below to a somewhat toothed wing, which does not quite reach the stem but terminates gradually or abruptly (usually with two rounded auricles), leaving a short naked petiole; lobes undulate-denticulate; the lateral short, broad, blunt or again sub-bilobed; the terminal ovate, obtuse, acutish or even acuminate: heads rather few and large, cymose-corymbed, individually pedunculate or grouped by 2's or 3's at the ends of the branches: involucre scales sub-biseriate, oblong, obtuse or rounded at the apex, $3\frac{1}{2}$ lines long: ray-

flowers 10–12; ligules 6 lines long, 2 to 3 lines broad; disk-flowers numerous, with the tube about a third as long as the amplified throat: fruiting heads globose, $1\frac{1}{4}$ inches in diameter; achenes 2 lines long: chaff lanceolate-attenuate, straight-pointed or nearly so, puberulent or almost glabrous except the strong ciliation of the margins, 4 to 5 lines long in anthesis, becoming 8 lines long in fruit. — Collected by C. G. Pringle, in gulches of hills of Las Sedas, Oaxaca, altitude 6,000 feet, 29 September, 1894, no. 4932, also by L. C. Smith, at Nacaltepec (Salomé), Oaxaca, altitude 6,500 feet, 21 September, 1895, no. 818.

Montanoa Rosei. Shrub 8 or 10 feet high: leaves opposite, slender-petioled, rhombic-ovate, serrate, not lobed, acuminate at the apex, cuneate at the base, rather harsh in texture, scabrous and somewhat rugose above, scarcely paler, finely pubescent and glandular-dotted beneath, 3 to 4 inches long, half as broad: corymbs ample: bracts linear: involucreal scales lance-attenuate, sub-uniseriate, silky-villous, $2\frac{1}{2}$ to 3 lines in length: disk-flowers about 4, with tube slender, nearly equalling the throat; rays about 3, about 2 lines in length: chaff densely fulvous-woolly. — *Montanoa (Enocoma)* sp., Rose, Contrib. U. S. Nat. Herb. i. 103. — Collected by Dr. E. Palmer, at Alamos, W. Mexico, 26 March to 8 April, 1890, no. 394.

Viguiera Nelsonii. Stem terete, densely silky-villous with white subappressed hairs: leaves attenuate at both ends, sessile, 3-nerved from above the base and pinnately veined, appressed silky-villous upon both surfaces, more densely so and paler beneath, 3 to 6 inches or more in length, $\frac{1}{2}$ to $1\frac{1}{4}$ inches in breadth: heads 12 to 20 in number, 12 to 18 lines in diameter, borne in a terminal corymbose panicle; the individual peduncles an inch or two long: involucreal bracts 2–3-seriate, narrowly oblong-lanceolate, silky-villous especially near the margins: somewhat thickened at the base; the tips lax and spreading: rays about 10, orange-yellow, oblong, slightly 2–3-toothed at the apex, 6 to 8 lines in length: disk-flowers more than 50, concolorous: chaff carinate, with strong midrib excurrent as a spreading tip: achenes somewhat compressed and inconspicuously 4-angled, appressed-villous: pappus of two aristæ somewhat broadened at the base, and intermediate squamellæ two on each side, ovate, ciliate-fringed. — Collected by E. W. Nelson, between Chilapa and Tixtla, Guerrero, altitude 5,200 to 7,000 feet, 17 December, 1894, no. 2169, and by L. C. Smith in mountains of Huitzo, Oaxaca, altitude 6,500 feet, 16 November, 1895, no. 899. As to character of achenes a dubious intermediate between *Viguiera* and *Encelia*, but in habit approaching more closely species of the former genus.

Verbesina Nelsonii. Stout, apparently herbaceous: stem striate-angulate, puberulent under a lens, internodes entirely wingless or with a broadish irregular deciduous corky wing near the summit: leaves green and glabrous on both surfaces, oblong, acuminate, penninerved, crenate-serrate, 6 to 8 inches long, $1\frac{1}{2}$ to 2 inches broad, below the middle slightly narrowed and somewhat crisped or undulate; the base broadly auriculate and amplexicaul, midrib prominent beneath, pale: heads numerous, of medium size, 4 to 5 lines in diameter, in a very dense terminal compound corymb; bracts oblong, small, scarcely herbaceous: pedicels tomentulose: involucre campanulate; scales about 10, subuniseriate, oblong, obtusish, 2 lines long; ray-flowers 4 to 6; ligules very small, yellow, 2 to $2\frac{1}{2}$ lines long, nearly a line in breadth: chaff obovate, mucronate, pubescent on the outer surface especially on the prominent keel: achenes a line long, hispidulous, with conspicuous wing on each edge, awns subequal. — Collected by E. W. Nelson, between Ayusinapa and Petallan, altitude 5,000 to 7,000 feet, 14 December, 1894, no. 2118.

Verbesina Smithii. Branching shrub: branches glabrous, wingless, covered with a pale grayish cortex roughened with numerous lenticels: branchlets gray-tomentose: leaves alternate, lanceolate, attenuate at both ends but obtusish and mucronulate at the apex, rather shallowly serrate-dentate except at the cuneate short-petioled base, bright green and scabrous-puberulent above, white-tomentose beneath, 3 to 4 inches long, 10 to 14 lines broad: heads small, 2 lines high, 3 lines broad, not very numerous in small terminal corymbs; these 2 inches in diameter not exceeding the surrounding leaves: bracts small, grayish-tomentose as well as the pedicels: involucre scales about 3-seriate, elliptic-oblong, obtuse, green, pubescent on the outer surface, ciliated, a line long: disk-flowers 30 to 35; ray-flowers about 8; ligules yellow, $1\frac{1}{2}$ to 2 lines long; chaff obovate, obtusish, yellow toward the summit, puberulent on the outer surface: achenes (immature) distinctly winged on each side; awns 2, slightly unequal. — Collected by L. C. Smith, at Jayacatlan, Oaxaca, altitude 4,500 feet, 10 September, 1894, no. 132.

Verbesina trilobata. Stems 5 to 10 feet in height, branched, glabrous, lucid, wingless, covered with light colored cortex: leaves opposite, decussate, rhombic in general outline, strongly 3-lobed, denticulate, gradually narrowed to a subsessile base, scabrous-puberulent above, grayish-tomentose beneath, subpalmately and rather obscurely 3-5-nerved from considerably above the base and reticulate-veined; terminal lobe elongated, ovate to oblong-lanceolate, acuminate; the lateral much shorter and rather blunt; sinuses rounded: corymbs much

branched, terminal, leafy-bracted at the base; bracts oblong-lanceolate, acute; pedicels finely grayish-tomentulose; heads rather small, numerous, radiate, few-flowered; involucre scales about 3-seriate; the outer considerably shorter, linear-oblong, obtuse, 1 to $1\frac{1}{2}$ lines long with subherbaceous tips; inner scales subscarious, about 3 lines long, a line broad, acute, glabrous, except the ciliolated margins: disk-flowers about 12; corollas glabrous; ray-flowers 2 to 3; ligules golden-yellow, $3\frac{1}{2}$ to 4 lines long: mature achenes 2 lines long, conspicuously winged on each margin, hispidulous on the surfaces; awns subequal. — Collected by C. G. Pringle, in rocky gulches, Monte Alban, Oaxaca, altitude 5,600 feet, 15 August, 4 October, 1894, no. 4875.

Verbesina variabilis. Shrub: branches striate-angled, mostly wingless and nearly glabrous: branchlets hoary-puberulent or glabrous, usually bearing narrow irregular deciduous brown corky wings decurrent from the bases of the petioles: leaves alternate, short-petioled, ovate or lance-oblong, sharply and finely serrate or mucronulate-denticulate, acute to shortly acuminate at the apex, cuneately narrowed at the base, 2 to 3 inches long, 9 to 12 lines broad, above green, strigillose-puberulent and very scabrous to nearly smooth; below scarcely paler, soft-pubescent on the pinnate and reticulated veins or quite glabrous: heads of middle size in terminal subsimple or compound corymbs, pedicels grayish-tomentose to merely puberulent: involucre scales about 2-seriate, green, oblong, obtusish; ray-flowers 10 to 12, yellow; ligules 6 lines long, about 2 lines broad, finely 2-3-dentate at the apex; disk-flowers about 60, pubescent: chaff cuneate, the apex truncate with short recurved apiculus: achenes very narrowly winged on both margins, about $1\frac{1}{2}$ lines long: awns 2, subequal. — Collected in three rather different forms, which, however, appear to have no satisfactory specific differences. The first, which may be regarded as the typical form, has rather broad dull green very pubescent leaves. It was collected by C. G. Pringle, Sierra de San Felipe, altitude 9,500 feet, 24 September, 1894, no. 4918, by E. W. Nelson, 18 miles southwest of the city of Oaxaca, altitude 7,500 to 9,500 feet, 10-20 September, 1894, no. 1393, and by C. Conzatti on Sierra de San Felipe, altitude 9,000 feet, 29 November, 1895, no. 31. A second form collected by Mr. Nelson on the top of the Sierra Madre near Chilpancingo, Guerrero, altitude 9,000 to 10,200 feet, 24 December, 1894, no. 2240, differs only in having narrower oblong leaves, which are somewhat lucid above and somewhat less pubescent. A third form, secured by Mr. Nelson at same place and date, no. 2215, has narrow oblong leaves, which are quite glabrous

beneath, and slightly lucid but finely scabrous-puberulent above. The species, to judge from characters, must be near *V. Seemannii*, Schz. Bip.

Dahlia tenuis. Root a cluster of 6 or 8 stout fibres, each enlarged and tuberiform in the middle: stem single, erect, very slender, 1 to 2½ feet high, simple below, covered with a short and dense pubescence, almost tomentulose: leaves small for the genus, pinnate to bipinnate, somewhat deltoid in general outline, on slender divaricately spreading petioles of nearly their own length; leaflets lanceolate, acute or acuminate at both ends, finely and sharply serrate or irregularly 2-3-lobed, green and nearly or quite glabrous above, pale and finely pubescent beneath, 8 to 12 lines in length, 3 to 4 lines in breadth: heads few and subcorymbose, or even solitary, including the rays 1½ to 2 inches in diameter: outer involucre of about 6 narrow thickish obtuse bracts, reflexed during anthesis; the inner scarious bracts lance-oblong, about 6 lines in length: rays about 8, pistiliferous. — Collected by E. W. Nelson, 18 miles southwest of city of Oaxaca, altitude 7,500-9,500 feet, 10 to 20 September, 1894, no. 1364; also by C. G. Pringle, Sierra de Clavellinas, altitude 9,000 feet, 27 October, 1894, no. 5807; and by L. C. Smith, on mountains of Telixtlahuaca, altitude 7,500 feet, 27 July, 1895, no. 481.

Flaveria vaginata. Perennial with stout lignescent root: stems several, ascending from a decumbent or even prostrate somewhat branched base, terete, striated, purplish, with bilineate short grayish woolly pubescence, leafy above, naked below except for the persistent and sheathing bases of the fallen leaves: internodes very short: leaves linear-subulate, clasping at the base, very gradually attenuate, often fascicled in the axils 1(-3)-nerved, rather pale green, finely ciliated toward the base: heads small, closely aggregated into terminal solitary or corymbose-paniculate glomerules; these simulating the normal involucre heads of the order: glomerules 6 to 8 lines in breadth, subtended by a few short recurved foliaceous bracts, and containing 30 or more heads: involucreal scales 3 to 4 in each head, hyaline: ray-flower solitary, conspicuous, 2½ lines long, with oblong slightly 2-3-toothed yellow ligule: disk-flowers 5 to 7, yellow: achenes black, lucid, about 10-nerved. — Collected by E. W. Nelson between Coixtlahuaca and Tamazulapam, Oaxaca, altitude 7,000 to 7,700 feet, 12 November, 1894, no. 1933.

FLORESTINA PEDATA, Cass. With this species, *Schkuhria glomerata*, Rob. & Seaton, based on Mr. Pringle's nos. 4289 and 5006, and published in Proc. Am. Acad. xxviii. 109, is identical.

Florestina platyphylla. Mr. Pringle's no. 4975, collected on Monte Alban, Oaxaca, and described in the *Am. Jour. Sci.* ser. 3, L. 156, as *Schukhria platyphylla*, appears upon further examination to be better placed in *Florestina*.

DYSODIA SERRATIFOLIA, DC. A specimen collected by L. C. Smith, below Jayacatlan, at 3,500 feet altitude, 9 February, 1895, corresponds with Ghiesbreght's no. 519, and with a fragment of the type from the De Candolleian Herbarium, in all respects, except in having the leaves mostly alternate, not opposite as hitherto described. The uppermost only are subopposite.

LIABUM GLABRUM, Hemsl. (*Biol. Cent.-Am. Bot.* ii. 232). This showy species, originally collected by Bourgeau, no. 1401, at Cuernavaca, in 1865, has now been rediscovered by Mr. Pringle in the same locality. His excellent specimens show the flowers to be bright orange-yellow and the leaves normally attenuate. Mr. Pringle notes that the plant attains a height of 15 feet.

Liabum Pringlei. Half shrub, 3 or 4 feet high: stems terete, fuscous-tomentulose: leaves opposite, ovate, acute, mucronulate-denticulate, green and puberulent above, densely white-tomentulose and reticulated with brownish veins below, rounded and 3-nerved at the base, 3 inches long, two thirds as broad; margins revolute; naked petioles but 2 lines long: heads few, large, $1\frac{1}{4}$ inches in diameter, discoid: involucre campanulate, multiseriate; scales pale brown (in dried state), lanceolate, attenuate, slightly sericeous: flowers about 75 in a head, yellow, 10 lines in length: achenes $2\frac{1}{2}$ lines long, sericeous: pappus of elongated stramineous bristles and very short outer scales. — Collected by C. G. Pringle, on mountains near Lake Chapala, Jalisco, altitude 7,000 feet, 18 October, 1895, no. 6215.

Cacalia peltata, HBK., var. *Conzattii*. Stem 1 to 3 feet high: inflorescence lax, 1–20-headed; heads 25–40-flowered; involucre 12-phyllous; calyculate, scales covered with a densely spreading pubescence. — Collected by Professor C. Conzatti on the Sierra de San Felipe, Oaxaca, altitude 9,000 feet, 29 November, 1895, no. 27; also by C. G. Pringle in the same region, altitude 10,000 feet, 13 December, 1895, no. 6238.

Senecio prionoapterus. Erect herb, 1 to 3 feet in height: stems somewhat flexuous, green, striate, slightly flocculose, rather broadly and interruptedly winged by the decurrent bases of the leaves, simple to the corymbose-paniculate flat-topped inflorescence: leaves lance-oblong, attenuate to a very sharp narrow apex, irregularly serrate-dentate, half inch

broad, 3 or 4 inches long, glabrate above, floccose-tomentulose beneath, not narrowed at the base but decurrent upon the stem for nearly two inches in two broad wings, these sharply toothed especially near the lower end: bracts lance-linear: pedicels spreading, 4 to 15 lines in length, bearing several subulate bractlets: heads about 50, erect, half inch long and including the 8 or 10 spreading oblong golden-yellow rays, about 9 lines in diameter: involucre calyculate, about 20-phyllous; scales attenuate; disk-flowers 40 to 45, shortly 5-dentate: ligules 3 to $3\frac{1}{2}$ lines long, 1 to $1\frac{1}{2}$ lines broad, 4-nerved. — Collected by C. G. Pringle, on hills, at Las Sedas, Oaxaca, altitude 6,000 feet, 3 December, 1895, no. 6282.

Gochnatia Smithii. Shrub? leaves clustered near the ends of the branches, oblong, entire, obtuse, cuneate at the base, thickish, grayish and covered with a very fine short tomentum above (perhaps later glabrescent), much paler, tomentose and veiny beneath: heads in numerous slender close terminal globose glomerules, 8 lines long, about 6-flowered; involucre green, very slender, and gradually turbinate; the scales in many (8 to 10) series, extending as it were down upon the pedicels, ovate to lanceolate, obtuse, pubescent: style-branches short, flattened, rounded: divisions of the corolla subequal, narrow: achene subvillous, $1\frac{1}{2}$ to 2 lines in length. — Collected by L. C. Smith, on hills of Cuicatlan, 30 April, 1895, at 3,000 feet altitude; also by E. W. Nelson along road from Totolapa to San Carlos, altitude 3,000 to 3,800 feet, April, 1895, no. 2546. Noteworthy for its very long slender closely imbricated involucre and globose inflorescences, the latter about 2 inches in diameter.

Perezia Cuernavacana. Glabrous: stems clustered, 2 to 3 feet high, striate-angulate, purplish, leafy: leaves oblong, obtuse and mucronulate at the apex, scarcely narrowed to the rounded sessile base, sharply denticulate with pungent teeth, reticulated and lucidulous on both surfaces, 2 to $2\frac{1}{2}$ inches long, 9 lines broad, ascending, imbricated, the uppermost gradually reduced: heads few, very large, about 30-flowered, 12 to 15 lines long and broad, terminal on long many-bracted peduncles: involucre turbinate, multiseriate; the scales greenish, silky-ciliate, the inner ones oblong, obtusish, $1\frac{1}{2}$ to 2 lines broad near the summit, the outer gradually smaller and extending as subulate spreading bracts some distance down the peduncle: corollas lilac in dried state, 9 lines in length: pappus tawny; achenes puberulent, $3\frac{1}{2}$ lines long. — A handsome species collected by C. G. Pringle, at Cuernavaca, altitude 7,000 feet, no. 6196.

Perezia umbratilis. Habit of *P. nudicaulis*: root horizontal, sending off numerous stout fibres; caudex multicapital, tufted with sordid

white wool: leaves all radical, runcinately pinnatifid, glabrous or nearly so, petioled, thin, acutish; lobes 5 to 7, mucronulate-dentate: stems about a foot high, slender, dark colored, quite smooth, bearing a few scattered minute appressed subulate bracts and at the summit 2 or 3 heads on slender ascending branches: heads 9 lines long, about 18-flowered: scales of the involucre in 5 series, obtuse, flattish (not thickened nor firm in texture), dark colored, ciliated, otherwise glabrous, the inner ones 5 lines long: flowers lilac in dried state, 7 to 8 lines long (including the achenes). — Collected by C. G. Pringle, in shade, at Tomellin Cañon, Oaxaca, altitude 3,000 feet, 1 December, 1895, no. 5966. Closely related to *P. nudicaulis*, Gray, but having a more numerous seriate involucre with thinner flatter scales, and flowers nearly twice as large.

SONCHUS ASPER, Vill. Although so generally distributed as a weed upon waste heaps, etc., this plant does not appear to have been noted in Mexican lists. It has been collected at San Diego, Chihuahua, by Hartman, and near the city of Oaxaca, by Nelson, no. 1353.